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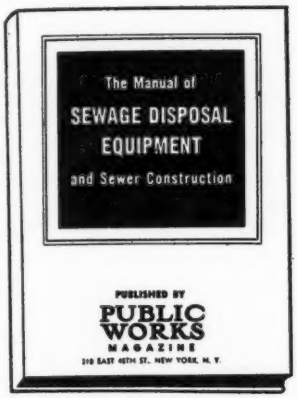

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Vol. 75 No. 7

A. PRESCOTT FOLWELL, Editor

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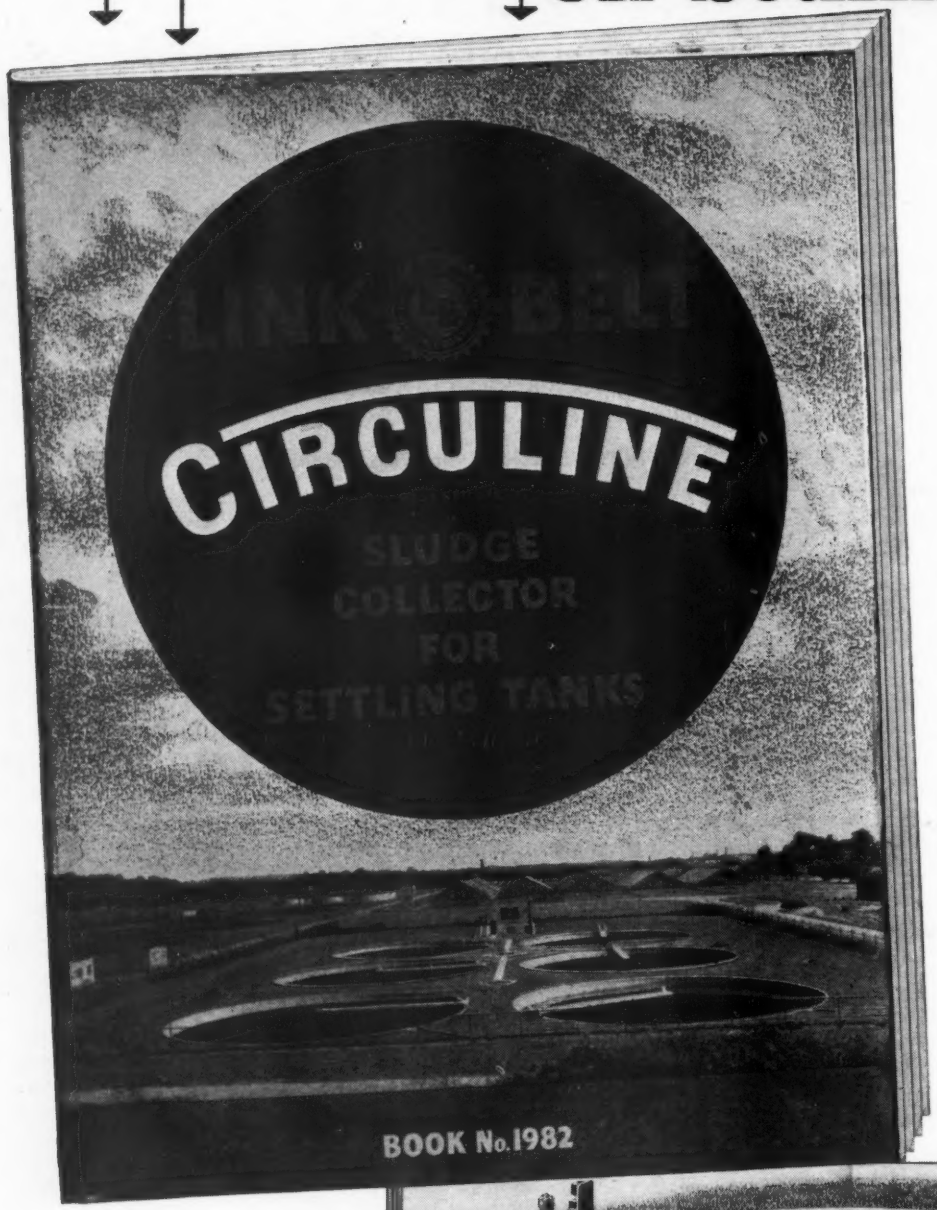
A NEW BOOK on Sedimentation



• Twenty-four pages of important information on the subject of sedimentation and sludge collection in round settling tanks. It contains photos of numerous installations, capacity tables, dimensions and other pertinent engineering information on Circuline Collectors. Shown for the first time is the new Type "B" collector illustrated below. This unit is especially suited for the treatment of average domestic sewage in round tanks up to 55′ diameter. The Type "A" collector for tanks up to 115′ diameter is also covered in this book. Send for a copy today.

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THE WAR EMERGENCY

Too Little and Too Late?

Major General Philip B. Fleming, Federal Works Administrator, stated on June 14th that the amount of State and municipal planning now under way is far too little "to make any appreciable contribution to economic stability immediately after the war." It has been estimated by A.P.W.A. that capital improvements valued at $550,000,000 were ready to contract on Jan. 1, 1944, in cities under 1,000,000 population, and about three times this amount was under survey. The figure mentioned would furnish perhaps a week's work for the number which it is estimated will need new jobs when the war ends. And they will need new jobs at once when they return. There should be at least ten times that amount of work that can be advertised for contract the day after the big fighting is concluded.

Better than the average is the picture in the State of Illinois. Illinois Postwar Planning Commission reported on June 1st that 160 municipalities (other than Chicago), 12 sanitary districts, 5 park districts, 69 school districts and 5 townships had reported programs totaling $192,675,464. But detailed plans and specifications were completed *or in progress* for only 16% of this amount, and 55% was in the stage of preliminary estimates only. The record of the 102 counties of the State is better, 43% of the plans for their $113,-032,578 program being in the 'completed or in progress" stage and only 26% still being preliminary estimates only.

Equipment for State Highway Work

Public Roads Administration is directing its district offices to report, for each State, the highway department's needs for maintenance equipment and material in relation to the importance of the routes to be maintained; this importance being classified as: 1—Routes of primary interest to the war effort; 2—routes on State highway systems and extensions through municipalities which carry heavy and medium traffic; 3—those on which communities are entirely dependent for transportation; 4—light-traffic State highways and secondary Federal-aid routes. The importance of the maintenance and repair operations themselves are classified as to highway elements as follows: a, surface; b, drainage; c, shoulders, d, minor structures; e, major structures; f, traffic service; g, roadside.

H. R. 4915 Highway Appropriation Bill

On June 2 the House Roads Committee reported unanimously H. R. 4915 (which replaced 4853) appropriating $1,500,000,000 of Federal aid funds in three equal annual installments, 45% for the Federal aid highway system either inside or outside municipalities; 25% for principal, secondary and feeder roads, including farm-to-market roads; and 30% for principal highways in urban areas on the Federal aid highway system. For the first year the States would supplement the appropriation with 2/3 the Federal fund; for the other two years with 100%. The fund is apportioned to the States on the basis of ½ population, ¼ area and ¼ postroad mileage.

Bill for Federal Assistance for Airports

On June 14 a Federal Aid Airport Bill (H. R. 5024) was introduced calling for the expenditure of a billion dollars in Federal funds for airport development, under a Director of Airports Service, a branch of the Civil Aeronautics Administration. This sum is to be appropriated $100,000,000 a year for ten years. It would be matched on a 50-50 basis by the States, which must set up a state airport agency, legislate for the prevention and removal of airport hazards, devote entirely to the development of civil aeronautics any taxes placed on aircraft fuel or aeronautical facilities and operations, and assure proper management and maintenance of all public airports.

Selling Prices for Construction Machinery

OPA on June 9 ruled that, beginning June 14, construction contractors can sell motor graders, crawler tractors, shovels, draglines, cranes and backhoes at prices ranging from 5% to 25% higher than formerly; also that the sales price for rebuilt and guaranteed machines can be increased by adding the cost of transportation from point of purchase to place of rebuilding to the 85% of price of equivalent new machines which still is the ceiling price.

Do Not Cut Roadside Milkweed

The U. S. Dept. of Agriculture asks State and county highway departments to refrain from mowing roadsides in areas where milkweed is prevalent until their pods have been harvested, as it desires to collect the floss to replace kapok in the manufacture of life jackets. At the request of WPB the Dept. of Agriculture is organizing a campaign to collect at least 1,500,000 lb. of milkweed floss this year.

Tar for Roads and Streets

Last month we stated on this page, under the heading "Asphalt for Roads and Streets," that no limitations are placed on the use of asphalt in 1944. We should have included tar, as there are no limitations on road tar either.

The Office of Defense Transportation has appealed to all city officials to assist in eliminating delays in tank cars and tank trucks assigned to the movement of tar and asphalt for street and highway projects.

Lumber for Postwar Plans

Although lumber is now difficult to obtain for non-military projects, postwar projects can be designed with a reasonable certainty that such will not be the case when they are constructed. The scarcity is due to excessive war demands and scarcity of labor (60,000

(Continued on page 49)

M-1 vs. Muck

● Rugged men driving rugged trucks for Uncle Sam plough ahead into jungles and forests, through rivers and over trails that would make even a pack animal think twice. Naturally, a truck crew can expect to have to yell for help every so often.

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With the exception of a restricted amount of much-needed civilian fire apparatus, our Ward LaFrance Truck Division factories are making nothing but military vehicles today. However, authorization has been received to manufacture a limited number of commercial trucks for civilian use during the latter part of this year. They will embody typical Ward LaFrance automotive engineering skill, and incorporate improvements born of this war. Why not write our Sales Department now.

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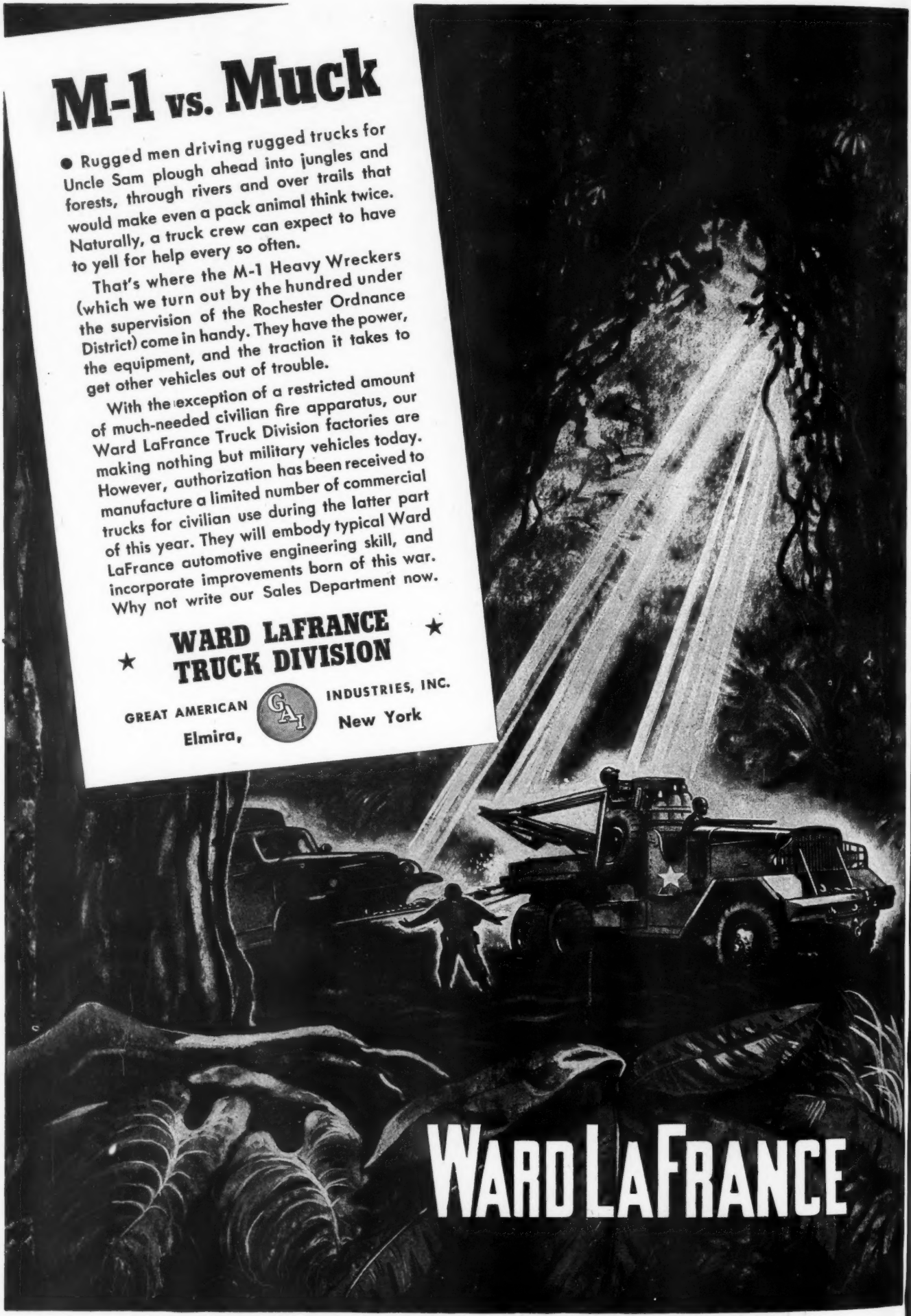

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Vol. 75. No. 7

Morse Road bridge after building two concrete piers to strengthen old truss until the proposed 3-span steel beam concrete-deck bridge can be built.

Building New Piers Under an Old Wooden-Truss Covered Bridge

By GUY H. ELBIN

Franklin County, Ohio, Bridge Engineer

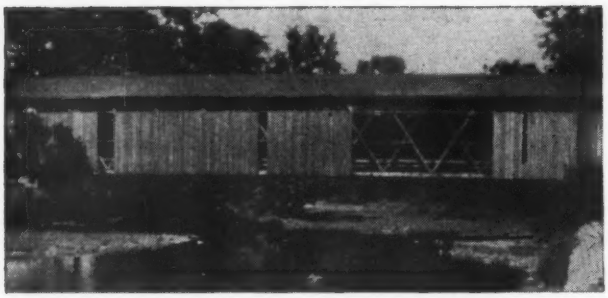
The old bridge required strengthening. Due to scarcity of steel, immediate construction of a proposed new bridge was deferred, but the piers for it were built and used to strengthen the old bridge.

AS A PART of our extensive program of rebuilding, replacing, strengthening and widening of bridges and culverts in Franklin County, Ohio, it became necessary to plan for the replacement of a 160-foot span wooden truss covered bridge, located on Morse Road over Big Walnut Creek. To have brought it up to something near its original condition would have required a new roof, new siding, new floor (the wood plank floor was in poor condition) and strengthening of portions of the truss. This repair, although costly, would have resulted in a below-standard and narrow structure, the clear width between trusses being only 17 ft. 6 in. It was therefore decided to replace it with a new three-span steel beam bridge with reinforced concrete abutments, piers and floors, and a railing of concrete posts with tubular steel panels, with a roadway 28 ft. wide between curbs.

The complete design for such a bridge was made, but due to scarcity of structural steel it was necessary to delay construction of the complete structure. It was, however, considered necessary to strengthen the existing wooden truss, and this was done by constructing the piers for the new structure and using them to support the old bridge.

Guy H. Elbin

After checking available maintenance material on hand, it was found that the piers could be constructed without interfering with our ordinary maintenance program. Due to scarcity of labor in our maintenance forces it was determined to advertise for contract, with Franklin County furnishing the critical materials from maintenance stock. No bids were received, however,



Morse Road bridge before removal of sides and construction of piers.

and it was necessary for us to delay other maintenance work and build the piers and make minor repairs under force account procedure with our regular maintenance men.

Wooden cofferdams were built and the excavation done by hand, and all work of building forms, mixing and placing concrete, removing forms and rubbing surfaces, blocking up the old structure, and removing the old roof and siding, was done with a crew of 6 men, except that, during the four days when concrete was placed, extra men were made available from other maintenance crews. The total cost was under the estimate made of the contract price on which no bids had been received.

Traffic was delayed, by limiting it to one lane, on only four days during pouring of concrete and some few hours during delivery of material. The concrete was mixed at the roadside and hauled in concrete buggies and placed by chuting.

Each pier is 36 ft. long and 2 ft. 6 in. thick, resting on a foundation 38 ft. by 6 ft. by 2 ft. thick; the east pier rising 18 ft. 3½ in. above the foundation to an elevation about a foot below the bottom chord of the existing truss; the west pier rising 17 ft. 10 in. to an elevation about 17 in. below the chord. Both piers are rounded at each end. The reinforcement used (½" to ⅞" round) totaled 5,916 pounds. Each side form was made of eight panels 8'3" x 9'2", each panel consisting of a frame of 2 x 4 studs and ¾" sheathing. The panels were held together by ½" x 4" machine bolts, four through each adjoining pair of studs; and the whole retained by horizontal wales spaced 3 ft. centers, each consisting of two 2 x 6 timbers. After the piers had been completed, a reinforced concrete cap was placed under each bridge beam.

Work was started September 1, 1943, and completed December 20, 1943.

Sewer Assessments Properly Levied in Proportion to Benefits Received

The Wisconsin Supreme Court has always consistently held, in harmony with decisions in other jurisdictions, that assessments for public improvements must be based upon benefits, and that special assessments, although based on the cost of the work, may not exceed the benefits accruing. A statute providing that the cost of construction of a sewer system for a village "shall" be assessed justly and equitably on lots and parcels of land intended to be benefited thereby in proportion to the benefits which will accrue was held not unconstitutional on the ground that it provides that the assessment shall be based on the cost of the work and not on the benefits received by the owners of abutting property, since very often "shall" in a statute is construed to mean "may," especially to avoid a constitutional doubt. The court concluded that the statute in question provided for the levying of special assessments in proportion to benefits received. (George Williams College v. Village of Williams Bay, 242 Wis. 311, 7 U. S. 2d 891.)

Service Charges for City Revenue

Increasing adoption of garbage collection charges and sewer rentals to offset decline in assessed valuations

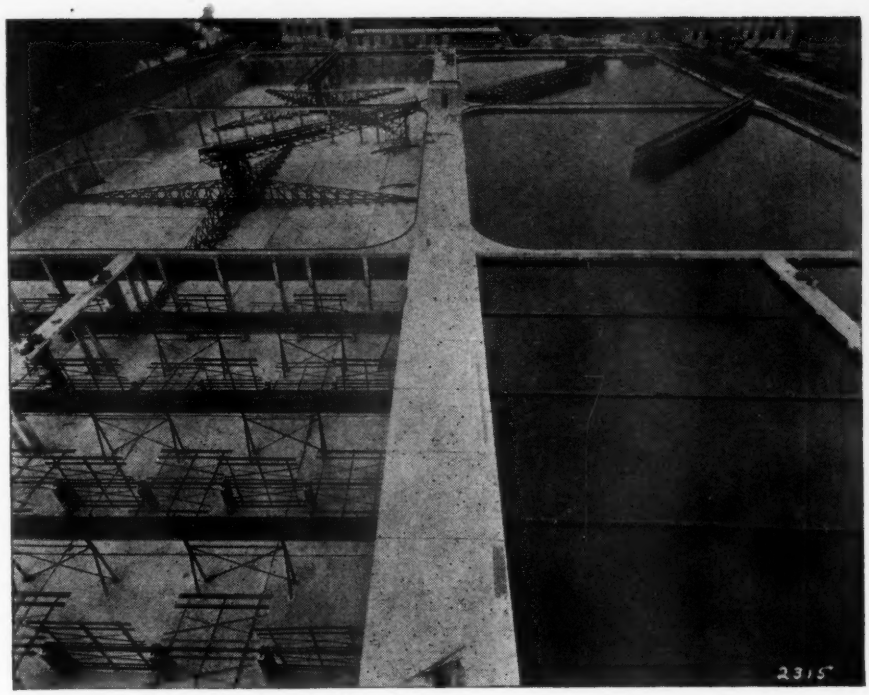
MUNICIPAL officials continue to show a great deal of interest in new sources of revenue, even though most cities have sufficient money for operating purposes. One reason for this interest is the continued decline in assessed valuations. Eighty-five cities, or 10 per cent of the cities of 10,000 or more population which reported information for *The Municipal Year Book*, indicated that a new locally collected revenue had been adopted during 1943 or that some old sources other than property tax had been increased. Some significant developments in 1943 were the increased use of garbage collection charges and sewer rentals, the adoption of admission taxes, an extension of business license fees, and an attempt to tax gross receipts or excess profits of private utilities. There were some developments in local sharing of state revenues.

Many cities adopted refuse collection service charges either for garbage alone or for all refuse. Cities adopting such charges in 1943 include Denton, Gatesville, Fort Worth, and Pecos, Texas; Garden City, Kansas; Crown Point, Indiana; Ironwood and Sault Ste Marie, Michigan; Chambersburg, Pennsylvania; Compton and Tulare, California; Columbus, Portsmouth, and Youngstown, Ohio; Downey and Stillwater, Oklahoma; Stevens Point, Wisconsin. Glencoe, Illinois; and Enumclaw, Ephreta, Leavenworth, Moses Lake, North Bend, North Bonneville, Oak Harbor, and Vancouver, Washington. Some of these cities are below 10,000 population.

Columbus anticipated a revenue of $360,000 a year, Youngstown $150,000, and Fort Worth $300,000. Charges usually range from 50 cents to $1 a month for homes in residential areas. Stillwater, Oklahoma, charges 30 cents a month for residences which is estimated to bring in a revenue of $1,430 a month, and Glencoe, Illinois anticipates a revenue of $8,000 a year. In Minnesota where a new law permitted the imposition of garbage collection charges against properties served on a special assessment basis, Northfield and St. Louis Park proceeded to finance their refuse collection expenditures by this method.

Sewer rentals as a means of financing large-scale sewer improvements were studied in a number of large cities, including Philadelphia, San Francisco, Toronto, and Los Angeles. In Philadelphia it was proposed that the sewer rental equal 115 per cent of the water bill and in Los Angeles that the sewer service charge be $3.60 per water service a year. Sewer rentals were adopted at Hillsboro, Mascoutah, Morrison, and Norris City, Illinois; Childersburg, Grove Hill, and Sulligent, Alabama; Mount Lebanon, Pennsylvania (to war housing only); Lakeland, Florida, $30,000 a year; Seminole, Oklahoma, $10,000 a year; Concord, New Hampshire, $10,000 a year; Laramie, Wyoming; and Renton and Kirkland, Washington.

From *Public Management*, organ of the International City Managers Association.



Water treatment plant for a large city—Cincinnati, Ohio. At left foreground, 2 flocculators, 120 x 175 ft. x 20 ft. deep. Beyond, in same tank, 2 clarifiers 175 ft. square. Duplicate units at the right, filled with water.

Present Trends in Water Treatment

Methods embodied in 274 plants constructed during 1941 and 1942, tabulated by states and population groups, show widespread use of the most up-to-date ideas and devices.

IN 1939, 1940 and 1941, the U. S. Public Health Service, with the cooperation of the State Departments of Health, undertook a nation-wide census of the water treatment plants in the continental United States. While not all the State boards furnished all the information requested, this compilation was, we believe, the most complete and reliable that has ever been made of such data.

The tabulated data were distributed in mimeographed pamphlets at the end of 1942. It is the intention of the U. S. P. H. S. to publish annual supplements in which will be furnished additional data not previously available, and especially those detailing new construction during the previous year.

The interest and value of these tables to the water works profession is evident. By a study of them and classifications of the data according to the features of special interest to the student, most interesting summaries can be made. The supplement bringing the data up to 1943, which is now at hand, shows that during 1941 and 1942, 274 new plants or additions to old ones were constructed; and a study of the treatment methods embodied in these plants should give a good idea of the present trend in the progress of water treatment. (We use the word "treatment" rather than "purification" for some of the procedures, such as corrosion correction and ammoniation, are not concerned directly with the purification of the water.) The following tables and discussion of the data have been prepared with a view to revealing some of the facts embodied in them.

The data are supposed to cover all plants for treating public water supplies in communities of over 100 population. The great majority of the plants were in small communities, the percentages in each of six population groups being as follows:

Population group	0-1,000	1,000 to 5,000	5,000 to 10,000	10,000 to 25,000	25,000 to 50,000	Over 50,000
Percentage of plants	35.7	33.8	16.2	6.2	3.7	4.4

The accompanying table gives the number of each group in the individual states.

Pennsylvania leads in the number of new plants—31, with Ohio next—27. Iowa had 21; Indiana, 20; Illinois, 19; Massachusetts and Minnesota, each 18, and Louisiana, 12.

Sources of Supply

Examining the sources of supply, these may be classified into two groups; ground water, mostly wells, with a few infiltration galleries, springs, etc.; and sur-

Method of Treating Water in Plants Constructed Since 1940

STATE	No. of Plants	I	H	A	C	T	S	M	F	D	N	K	R
Alabama	7	—	—	1	7	—	7	7	7	7	—	3	—
Arizona	1	—	—	1	1	—	1	—	—	—	—	—	—
Arkansas	6	—	—	3	5	2	5	4	5	6	2	1	—
California	1	—	1	1	1	1	1	1	1	1	1	1	1
Colorado	2	—	—	—	1	—	—	1	2	2	—	—	—
Florida	1	—	—	—	—	—	—	—	—	1	—	—	—
Georgia	4	—	—	—	3	—	3	3	3	4	2	2	—
Illinois	19	14	8	13	6	—	15	5	19	11	—	8	1
Indiana	20	3	2	1	3	1	2	3	5	19	1	1	—
Iowa	21	10	8	12	2	1	3	2	16	21	1	8	—
Kansas	4	—	—	—	—	—	—	—	—	3	—	1	—
Kentucky	5	—	2	—	3	1	3	3	4	5	—	2	—
Louisiana	12	1	3	2	3	2	3	3	3	12	1	1	—
Maine	2	—	—	—	2	—	2	2	2	2	1	—	—
Maryland	1	—	—	1	—	—	—	—	1	1	—	1	—
Massachusetts	18	1	—	4	3	—	4	1	6	18	6	7	—
Minnesota	18	6	—	5	—	—	—	—	5	3	—	11	—
Mississippi	4	—	—	1	—	—	—	—	—	4	—	—	—
Missouri	1	—	1	—	—	—	—	—	1	1	—	—	—
Nebraska	4	4	2	4	1	—	4	1	4	—	—	—	1
New Hampshire	2	—	—	—	—	—	—	—	—	2	—	—	—
New Jersey*	23	2	1	3	2	1	1	—	4	23	3	2	—
New York	2	—	—	1	—	—	—	—	1	2	1	—	—
North Carolina	6	—	—	1	3	1	3	3	3	6	2	3	—
North Dakota	1	—	1	—	1	—	1	1	1	1	—	—	—
Ohio	27	9	14	12	15	3	14	14	19	17	1	1	14
Oklahoma	2	—	—	—	—	—	—	—	—	2	—	—	—
Pennsylvania	31	1	3	3	13	3	13	9	13	31	2	1	—
Rhode Island	1	—	—	—	—	—	—	—	—	1	—	1	—
South Carolina	3	—	—	—	2	2	2	2	2	2	1	3	—
South Dakota	5	1	4	1	4	—	4	4	4	5	2	1	—
Tennessee	6	—	1	2	5	—	5	4	5	6	2	6	—
Texas	7	—	3	3	5	1	4	4	4	7	—	—	—
Utah	1	—	—	—	1	—	1	1	1	1	—	—	—
Vermont	1	—	—	—	—	—	—	—	—	1	—	—	—
Washington	1	—	—	—	—	—	—	—	—	1	—	—	—
Wisconsin	4	3	1	3	1	—	1	—	3	3	—	2	—
Total	274	55	55	78	93	19	102	78	144	232	29	67	17
Percent of the total 274 plants		20.7	20.3	29.0	34.3	7.0	37.7	29.0	53.1	86.0	10.7	24.7	6.3

*No data on dates of construction of New Jersey plants.

face supplies—streams, lakes, impounding reservoirs, etc. The table shows the number of new plants in each state treating water from each of these sources.

In the country as a whole, 73.6% of the new plants were for treating ground water. This does not mean that these were all new supplies, for some new plants were undoubtedly built to treat existing supplies. On the other hand, these data include only new treatment plants, and some new supplies may have been installed without treatment and so not be included; and since it is considered more necessary to treat surface supplies than those from wells, the probability is that most of the unlisted new supplies (if any) were wells. It seems justifiable, therefore, to conclude that at least 70% to 75% of the new supplies provided in 1941 and 1942 were from ground water.

The geographical distribution is indicated by the table. In New England, 8 of the total of 24 were ground water. In the group of mid-western states, Ohio, Indiana, Illinois, and Iowa, there were 77 ground water supplies and only 10 surface.

Water Treatment Plants Built Since 1940
Sources of Supply, Classified by Sizes of Communities Served

G = Ground water; chiefly wells, a few springs and others.
S = Surface supplies; streams, lakes and impounding reservoirs.

STATE	No. of Plants	Less than 1,000		1,000 to 5,000		5,000 to 10,000		10,000 to 25,000		25,000 to 50,000		Over 50,000	
		G	S	G	S	G	S	G	S	G	S	G	S
Alabama	7	..	2	..	2	..	1	..	1	..	1	..	..
Arizona	1	..	..	..	..	1	..	..	..	..	..	..	..
Arkansas	6	..	..	3	1	..	..	..	..	..	1	..	1
California	1	..	..	..	..	..	..	..	..	..	..	..	1
Colorado	2	..	..	..	1	..	..	..	..	..	1	..	..
Florida	1	1	..	..	..	..	..	..	..	..	..	..	..
Georgia	4	1	..	..	1	..	..	..	..	..	..	..	2
Illinois	19	13	..	3	1	1	..	1	..	..	..	..	..
Indiana	20	8	..	6	..	4	..	..	..	..	..	1	1
Iowa	21	14	..	3	..	2	1	..	1	..	..	..	..
Kansas	4	..	..	2	..	1	..	1	..	..	..	..	..
Kentucky	5	1	..	3	1	..	..	..	..	..	..	..	..
Louisiana	12	1	..	5	..	2	2	..	..	2	..	..	..
Maine	2	..	..	..	..	..	2	..	..	..	..	..	..
Maryland	1	1	..	..	..	..	..	..	..	..	..	..	..
Massachusetts	18	..	1	3	1	3	2	2	3	..	..	..	3
Minnesota	18	9	..	7	..	1	..	1	..	..	..	..	..
Mississippi	4	1	..	2	..	1	..	..	..	..	..	..	..
Missouri	1	..	..	1	..	..	..	..	..	..	..	..	..
Nebraska	4	1	..	2	..	1	..	..	..	..	..	..	..
New Hampshire	2	..	2	..	..	..	..	..	..	..	..	..	..
New Jersey	23	5	..	7	2	6	..	1	1	1	..	..	..
New York	2	..	..	..	1	..	1	..	..	..	..	..	..
N. Carolina	6	2	1	..	2	1	..	..	..	..	..	..	..
N. Dakota	1	..	..	1	..	..	..	..	..	..	..	..	..
Ohio	27	14	2	6	1	..	1	1	..	..	..	..	2
Oklahoma	2	1	..	..	..	..	..	..	..	1	..	..	..
Pennsylvania	31	9	3	5	3	4	2	2	1	1	1	..	..
Rhode Island	1	..	..	1	..	..	..	..	..	..	..	..	..
S. Carolina	3	..	..	..	1	1	..	..	..	..	..	..	1
S. Dakota	5	1	1	3	..	..	..	..	..	..	..	..	..
Tennessee	6	..	..	3	1	..	2	..	..	..	..	..	..
Texas	7	..	..	2	1	1	1	..	1	..	1	..	..
Utah	1	..	..	..	1	..	..	..	..	..	..	..	..
Vermont	1	..	..	..	..	..	..	1	..	..	..	..	..
Washington	1	1	..	..	..	..	..	..	..	..	..	..	..
Wisconsin	4	1	..	3	..	..	..	..	..	..	..	..	..
Total	274	85	12	71	21	30	15	10	8	5	5	1	11
Percentage G is of the total number	73.6	87.6		77.2		66.0		53.0		50.0		8.3	

Considering them by population groups, we find the percentages of ground water supplies to be as follows:

Population group	0-1,000	1,000-5,000	5,000-10,000	10,000-25,000	25,000-50,000	Over 50,000
Percentage ground water	87.6	77.2	66.0	53.0	50.0	8.3

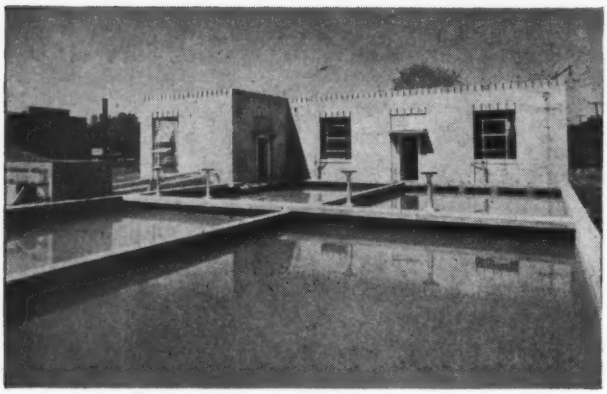
The tendency of communities of less than 50,000 population to rely on ground water supplies is evident. On the other hand, only one of the 12 cities of over 50,000 population derives its water from wells.

Method of Treatment

The methods of treatment adopted for these new plants were numerous and varied in their combinations; as it natural, since the waters to be treated vary widely in their characteristics. The U.S.P.H.S. divided them into ten general classifications; and each of these is subdivided, into as many as six variations in some cases. To attempt to summarize all these subdivisions would greatly complicate the picture without compensating advantages; as, for example, to distinguish between the various types of mixing devices; and we will consider only the ten main classifications: Aeration, chemical dosage, activated carbon, sedimentation, mixing device or tank, filters, disinfection, ammoniation, chemical dosage for corrosion correction or water stabilization, and recarbonation.

Key to the symbols used in the table "Methods of Treating Water in Plants Constructed Since 1940."

A = Aeration
C = Chemical dosage for coagulation or softening
D = Disinfection
F = Filters
H = Softening plant
I = Iron or manganese removal
K = Chemical dosage for corrosion correction or water stabilization
M = Mixing device or tank
N = Ammoniation
R = Recarbonation
S = Sedimentation
T = Activated carbon



Softening and iron removal plant at Opelousas, La. Population 9,000. Includes aeration contact bed, filters and disinfection.

In addition to these, the plants as a whole are classified as purification, softening, removal of iron or manganese, and disinfection. The number of plants in each state employing each of these classes of treatment in their recent construction is shown by the table. For example, in Alabama's 7 plants, all use chemical dosage, disinfection, sedimentation, mixing and filtration, 3 use corrosion correction and 1 aeration.

Disinfection is of course the most common treatment; 86% of the plants provide it. Filtration is provided by 53.1% in ten of the states by all the plants. Sedimentation tanks number 37.7%; chemical dosage 34.3%.

Softening is included by 55 plants, and iron or manganese removal by 55. These are not confined to the large communities; most are in those of less than 10,000 population, and quite a number in those of less than 1,000. Iron removal was provided by 14 of the 19 plants in Illinois, in 10 of the 21 in Iowa; in all of those in Nebraska.

The plants range in completeness of treatment from disinfection only to a combination of practically all the classes named; an example of the latter being Granite Falls, N. Carolina, population 1,873, which in 1942 built a plant of 300,000 gpd rated capacity which provides the following treatments: Ammonia gas, chlorine gas, lime and alum, baffled mix, sedimentation, rapid sand filtration, ammoniation and chlorination again, and finally alkali feed for pH adjustment.

No figures were obtained of 1941-1942 installations of water supplies that did not include some treatment; but disinfection is now so common (only 39 plants did not provide it, and practically all of these filter the water) that it seems improbable that there were many which did not include at least this.

The data show a most satisfactory condition. That such small communities, 85% of them under 10,000 population, and 79% of these using underground supplies, have adopted the most approved methods of purification, softening, corrosion correction and otherwise rendering the water safe, palatable and as nearly perfect as possible, should be most gratifying to sanitary engineers and those who have developed and provided the necessary equipment, to whom the credit is largely due.

Unionizing Municipal Engineers

With so much present discussion for and against unionizing civil engineers, the following item from the *South African Municipal Magazine* may be of interest.

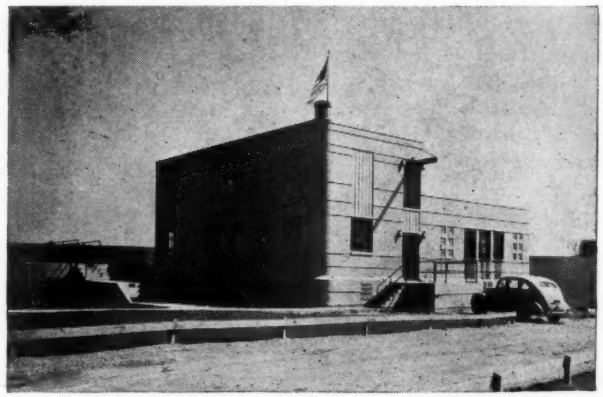
"Closed Shop" Wanted. Negotiations have recently been going on between the S.A. Municipal Employees' Association and the Port Elizabeth City Council for the introduction of the "closed shop" principle in the Port Elizabeth Municipality. The basis of the demand was that all employees in the municipality should become members of the Association, including such executive members as the Town Clerk, City Engineer, Medical Officer of Health and other heads of departments.

A conciliation board was appointed, consisting of council and employee representatives, at which counter proposals by the council were considered, but no settlement could be reached. As a result, the matter has been referred to the Minister of Labour who will, it is anticipated, refer it to arbitration.

Air-Entraining Properties of Cement

"Recent investigations have indicated that the best performance of concrete in resistance to surface scaling and to freezing-and-thawing tests was obtained when the concrete contained about 3 to 5 per cent entrained air. It was also pointed out that air contents above 5 per cent produced no appreciable increase in resistance and caused reduction in strength as the air content increased.

"Small amounts of Vinsol resin are frequently employed to entrain air in concrete mixes. The resin is usually added to the cement during the finish grinding of the cement clinker; however, air entrainment can be obtained by the addition of a solution or an emulsion of the resin at the time of mixing the concrete."



Waterworks and control building at Canton, Ill. purification and softening plant. Population 12,000.

W. J. McCoy, research chemist of the Lehigh Portland Cement Co., thus introduces a paper (published in the *Bulletin* of the American Society for Testing Materials) in which he describes an investigation made to learn the relation between the amount of Vinsol resin added to a cement and the amount of air entrainment produced in the concrete. The conclusions were as follows:

"Evaluation of the data obtained in this investigation indicates that the percentage of Vinsol resin, the alkali content, and the character of the clinker in a portland cement have little relation to the air entrainment produced in a mix. The efficiency of Vinsol resin in causing air entrainment seems to depend on the availability of the resin. The Vinsol resin dissolved during the mixing operation appears to be an index of the availability. This availability varies from one cement plant to another and in some cases from one grind to another in the same plant."

Collection and Disposal of Grease

By training in the use of grease traps, the amount of grease reaching the treatment plant was reduced from 1100 to 200 pounds per day. Condensed from a paper before the Conference on Military Sanitation for Sanitary Corps Engineers and Entomologists.

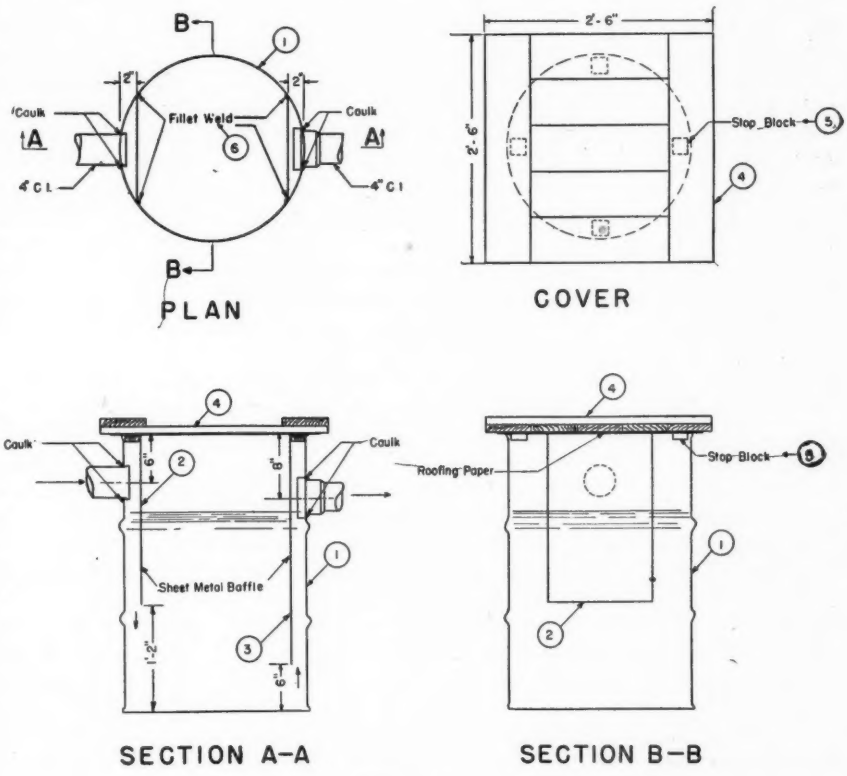
By HERMAN M. ROSS
Captain, Sanitary Corps

THE problem of collection and disposal of grease at army camps as it affects us today is peculiar in that certain standard equipment is at our disposal which must be utilized in the conduction of any program for the solution of this problem. It is my belief that the best results of such a program can be obtained if this equipment, its capacities and its shortcomings be thoroughly understood. The installation and type of this equipment are controlled by specifications which were originated toward the close of 1941 as a result of over a year's research conducted jointly by the U. S. Army Engineers R. & U. Branch, and a research committee formed by the Plumbing and Drainage Manufacturers Ass'n. The specifications call for the installation of certain types of grease traps to be installed in the interior of army mess halls and kitchens adjacent to the fixtures which they serve.

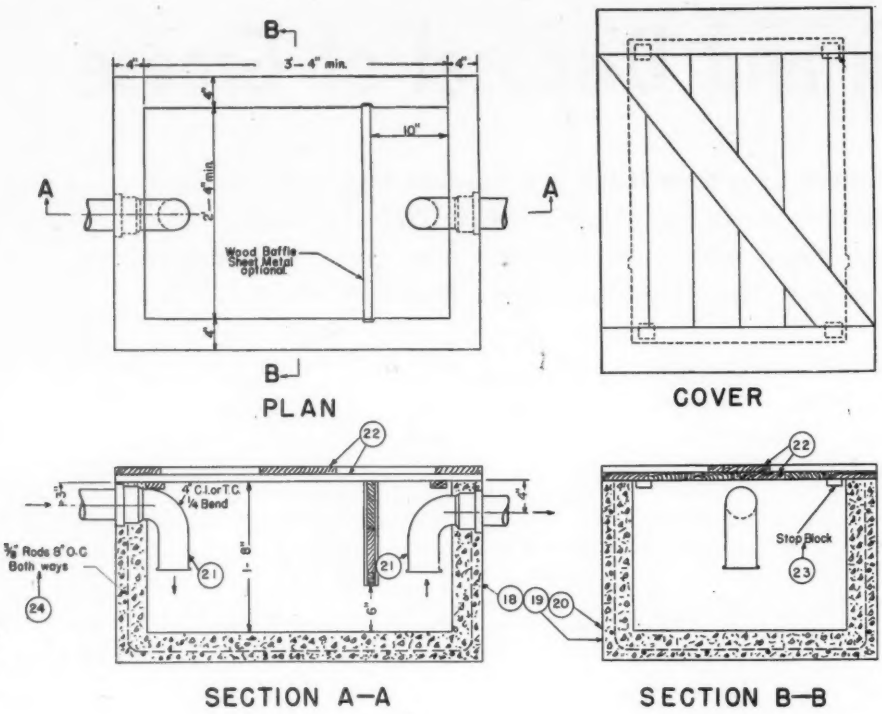
Before the expansion of army cantonments and designing of the new camps in 1941, the grease problem had been a minor one. The old army specifications 1700 E and 3400 E, covering the installation of grease traps, were incorporated in the early specifications for the new camps; but when the camps were occupied there was considerable difficulty with clogging of waste lines and operation of the treatment plants, caused by excessive amounts of grease entering them. Investigation led to the conclusion that the grease trap specifications were decidedly inadequate, which led to the research and resulting specifications referred to above.

A major consideration, in addition to that of sanitation, maintenance and operation of waste lines, sewers and treatment plants, was the recovery of grease in such a condition that it would retain a salvage value. After preliminary discussions, it was decided that the best way to remove grease from the kitchen wastes in a condition where it would be salvageable, was by the utilization of properly installed equipment placed as close as possible to the source of greasy waste discharge. In this way, it was felt that the grease would be removed from the waste before it had a chance to become contaminated or mixed with sewage to such a degree as would convert it into a state where its salvage value would be practically nil.

Specifications 1700 E and 3400 E called for installations of grease traps based on the number of meals served in the particular mess hall. This, in itself, was an erroneous method of recommending the proper sized grease trap. All the grease traps on the market and approved for use by the Army at that time were based on the design characteristic which depended upon the rate of flow through the grease trap, and it is immediately apparent that the discharge rates from any particular sink installation does not depend at all upon the number of meals served in that mess hall. So, consideration was given and a study made of the rates of discharge from the standard sink installations in the 700 and 800 series buildings which actually occurred during operation. The committee visited several army posts and ran discharge rates on a number of installations, and a flow table was set up showing the actual



TYPE I
STEEL OIL OR GASOLINE DRUM
One type of grease trap approved for army camps.



TYPE 4

CONCRETE

Another type of grease trap approved for army camps. (See Material List on page 19.)

rates of flow from these several standard installations.

Investigation was then made of all available grease interceptors to determine which of these would meet the requirements for adequate separation of grease under the rates of flow normally encountered by the standard sink installation. The University of Iowa Hydraulics Laboratory was enlisted in this program for the purpose of setting up a standard laboratory test which would approximate as closely as possible actual field operating conditions and which could be used to measure the efficiency of the various grease traps under the required conditions of installation which had previously been determined by the committee.

An arbitrary figure of 90% efficiency in the removal of free grease during the period of operation was set up as acceptable, and the series of tests were then run. The results of these tests indicated that in order to find or design a grease trap which would be adequate for the standard installation, the size of these traps would have to be so large as would make them prohibitive of installation. This presented the problem then of providing some means of reducing the rates of flow by a combination of fixtures or by the design of special flow-restricting fixtures which would reduce that rate of flow to such an extent that a feasible sized grease interceptor could be utilized, while at the same time it would not reduce the rate of flow from the fixture to such an extent that it would inhibit the proper mess operation in the cleaning and washing of mess utensils. This investigation developed the flow-control tee, which is now a regular part of all grease trap installations.

The final result of several months' experiment and investigation was the specification now used in army camp construction, namely Section 35-15d of Federal Specifications for Theater of Operations Mobilization Construction, which requires the installation of a grease trap under each sink in the mess hall from which greasy wastes will be discharged, the installation to be made in accordance with the Office of Quartermaster General, Construction Division, R. & U. Branch, Drawing No. 12-41-12 76A. This is the installation which we find in practically all of our camps today—a grease interceptor which will separate approximately 90% of the free grease at a flow rate of 25 gallons per minute with storage space for 50 pounds of grease. The flow control tee, which is a part of this installation, is to guarantee that the rate of flow through the grease trap will be maintained within this rate of flow at all times. The 50-pound storage capacity is required to prevent the necessity of too frequent cleaning of these traps.

A definite part of the specifications governing the purchase and installation of these grease traps is that a certificate must be furnished showing that each particular model of trap furnished under contract to the government has been tested and proven to remove 90% of free grease at a flow rate of 25 gallons per minute while maintaining in storage up to 50 pounds of grease. The University of Iowa Hydraulics Laboratory has been set up as the official testing laboratory by the army in this program.

Perhaps the best method of discussing the problems which exist at the various posts and their solutions is by the use of a typical example. I should like to use Camp Hale, Colorado, as my illustration; first, because the problems we encountered there are typical; secondly, because the methods which we used in solving these problems can be readily applied at any post; and thirdly, because these methods have been working and the results achieved have been somewhat gratifying.

When we first started on our problem of grease recovery, collection and salvage, we found we were getting very little waste grease from the messes, while at the same time we were recovering about 1,100 lbs. of grease and scum daily from the primary tank of our sewage treatment plant. This sewage grease had no salvage value whatsoever. In addition, we were worried about our filters. Our primary tank is by no means 100% efficient in the removal of grease and scum and the recovery of 1,100 lbs. of grease daily indicated we were getting a considerable amount of it carried over, which might eventually lead to clogging of our filters.

Past experience has shown us that the greatest offender in cases such as this was an untrained or improperly operating mess personnel; so, as a first step, a training program in Mess Operation was set up, consisting of a series of lectures, attendance at which was required of all mess officers and mess sergeants. These did not deal with grease traps alone; but in discussing these, we told the men of the difficulties experienced in the sewage treatment plant caused by grease. We

told them of salvage loss in cash value and in products useful to the war effort created by improper recovery of grease, and showed them how the situation could be remedied. They were instructed in the proper manner of conserving and storing waste cooking fats. The purpose of grease trap installations was fully explained. The things we had found them doing wrong were called to their attention and the correct procedures for grease trap maintenance and cleaning, and the proper method for storing the trap grease was given to them.

For example, grease traps were being completely emptied for cleaning in preparation for Saturday morning inspection. Now, removing the entire contents of grease traps causes improper functioning of these traps; a great deal of turbulence is created by the incoming waste water until such time as the trap is again completely filled, preventing the proper separation of grease from the waste and resulting in reduced efficiency of operation; and the removal of the entire trap contents meant the removal of the baffles within those traps, and many of these were broken and not replaced at all, while others were improperly replaced.

The proper cleaning of a grease trap is a very simple operation and an important part in the maintenance of its efficiency. The entire contents of the grease trap should never be removed. In order to clean the trap properly the cover should be removed and the grease layer skimmed from the top; the outside of the trap should then be cleaned of all drippings and the cover replaced: And *that is all.* At the same time, the siphon vent (the small opening above the water line on the inside of the trap adjacent to the outlet leg) should be checked to insure that it is open and functioning. If this vent opening becomes clogged with grease or dirt. there is danger of creating a siphon in the line which can draw out the entire contents of the trap—including all the grease which has been separated and stored therein.

An improper practice rather commonly found was that of dumping the waste contents of cooking vessels down the floor drain and washing these utensils on the floor over these drains. In addition to by-passing the grease traps and thus allowing all of this grease to find its way to the sewage plant, this practice is an excellent contributor to the clogging of building waste lines.

We set up a regular schedule for cleaning of grease traps. All traps would be cleaned every other day. While most of the traps would not be filled to capacity in this period, it insured that all traps would be cleaned before any possibility of exceeding the capacity in any specific instances would be created. Also, by setting up this schedule, it insured that the cleaning of these traps became a regular part of the mess operation.

The effectiveness of this program was very quickly apparent. Within the two weeks following, we had reduced the amount of grease recovered from the sewage plant from 1,100 lbs. to 400 lbs. per day with comparable increase in the amounts being salvaged from the messes. This quantity has gradually decreased until, at the present time, we are getting about 200 lbs. of grease and scum per day from our primary tank.

Similar efforts at other posts show practical elimination of the grease problem in filter operation. But when the cleanout type flow-control tee has not been placed ahead of the grease traps, or an unvented siphon

MATERIAL LIST

ITEM	QUAN	UNIT	SIZE & RATING	DESCRIPTION
			TYPE 1	
1	1	Ea.	Any available Size	Steel Drum
2	1	Pc	1'-2"x 1'-10" 20 Ga.	Sheet Metal Inlet Baffle
3	1	Pc	1'-2"x 2'-6" 20 Ga.	Sheet Metal Outlet Baffle
4	8.75	Bd. Ft	1"x 6"	Lumber for Cover
5	4	Ea	1"x 2"x 2"	Stop Blocks
6	1	Lb	1/4"	Welding Electrode
			TYPE 4	
18	2½	Sack		Cement
19	.18	Cu.Yd.		Sand
20	.37	Cu. Yd.		Gravel
21	2	Ea.	4"	C.I. Soil Pipe ⅛ Bend
22	20.5	Bd.Ft	1"x 6"	Lumber
23	4	Ea.	1"x 2"x 2"	Stop Blocks
24	82	Ft.	3/8	Reinforcement Rods

List of Materials Required for Constructing Traps of Types 1 and 4

Four types of grease traps are approved: Types 1 and 4 shown herewith; type 2, a gasoline drum with c. i. quarter bends instead of baffles; and type 3, of all wood construction.

leg has been created by locating the traps below the mess hall floor, grease collection has not been satisfactory and grease at the primary portion of the plant is still troublesome. At some posts where a definite schedule is not followed in cleaning the traps after the 50 pound retention capacity has been reached, plant operators still report trouble in the sewers and at the plant.

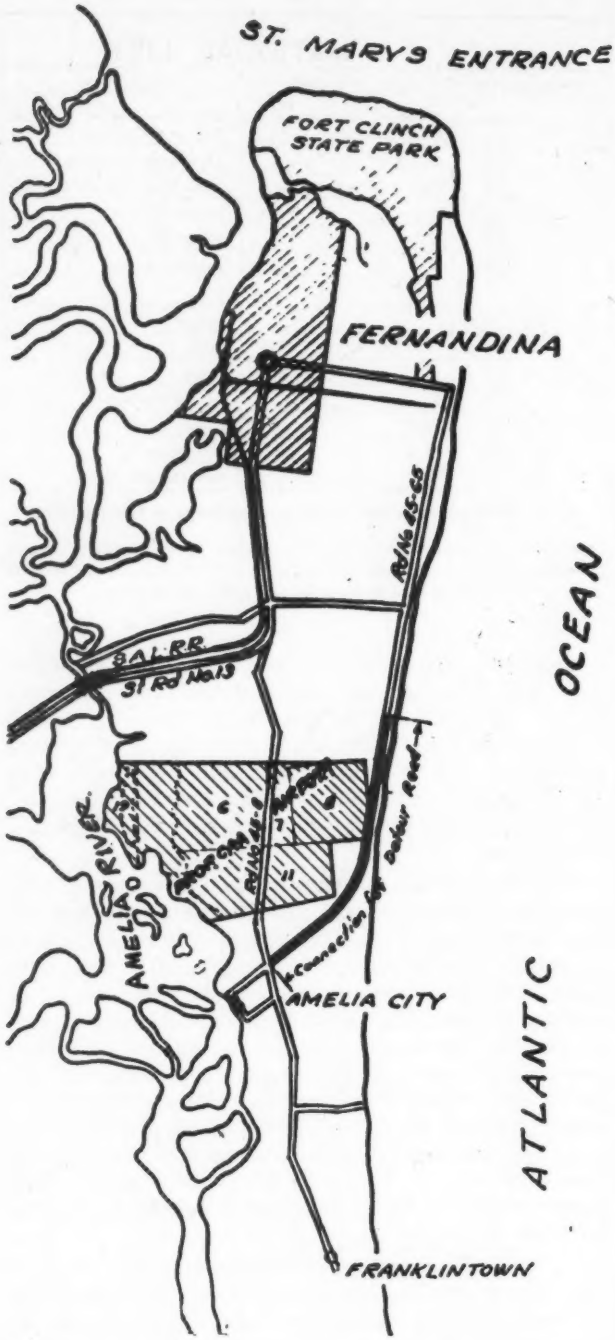
Final disposal of this trap grease is a Quartermaster function. Salvage officers from some posts have reported receiving as high as 2½ to 3 cents per pound for this type of salvage grease, while other posts have found it necessary to incinerate this waste grease in order to be rid of it. Our contract for the sale of trap grease ran out several months ago and no one could be found to renew it. Because of the isolation of this Camp and the attendant transportation difficulties in carrying materials to and from the Camp, the transportation rates nullified any value this waste grease had. However, we are still selling our waste cooking grease which naturally has a much higher value than the trap grease.

In looking for some way of increasing the value of this trap grease to where it would be comparable to the waste cooking grease and could then be sold, we have designed a rendering plant which is at present being installed at our sewage treatment plant. The process involved is simply boiling, screening, reboiling and skimming to remove as much as possible of the dirt and extraneous materials from the grease. We expect to run through this rendering plant also the grease recovered from our primary tank and thus add to the amount we can recover for salvage.

The plant is neither expensive, elaborate nor complicated. It is made up completely of salvage materials found around the Camp. It consists of two old 55-gallon oil drums, and one salvaged hot-water tank built into a home-made brick furnace. A system of piping allows the grease which is poured into the first 55-gallon drum to be boiled and then drawn off into the second 55-gallon drum, through a conical basket screen. There it continues to be boiled while continuously being skimmed and the skimmings drawn off into the hot-water tank, where it is again boiled and skimmed and these skimmings are then drawn off in suitable containers for salvage.

The Municipal Airpo[illegible] F[illegible]

By W. C. DRAGER
City Manager of Fernandina



ONE of the first major projects of Mayor-Commissioner G. Ralph Wolff after he took office was the development of an airport at Fernandina, Florida, and he was in constant contact with the Navy board which investigated the proposed site. The airport was approved and a certificate of necessity concerning its construction and completion issued on March 6th, 1943. Plans were prepared promptly and construction was begun on July 19th.

The Fernandina airport is located on State Road 45-8, three miles south of Fernandina, between Amelia River and the Atlantic Ocean. The airport area covers approximately 1600 acres. It is located on a level, sandy plain, varying in elevation from 12 to 16 feet above mean low sea level.

The design as approved by the Civil Aeronautics Administration and the U. S. Navy Department called for four 150-feet by 5000-feet paved runways, with 1000-feet safety zones on each end, and four 50-feet paved taxiways. The runways are laid out in the following directions: N-S; E-W; NE-SW; and NW-SE. The prevailing winds of this section are NE-SW. All drainage was carried west to the Amelia River, this being the natural slope of the area. It was found to be impracticable to attempt drainage to the ocean, due to distance, excessive cuts required for ditches, and the possibility that the drainage system might be blocked by high ocean tides caused by heavy blows and storms. (On April 17, 1943, high tide was recorded at 3.7 and low tide 1.8, mean low tide being taken as 0.0. Taken from the U.S.C.G. 1943 records, the mean range of tides is 5.6, and of spring tides 6.6.) Also a bridge or large culvert would have been required for the proposed new location of the highway. Due to the drainage all going west and over a considerable distance, it was found necessary to excavate a tidewater canal 6,800 ft. long, with 5 ft. width of bottom, 8 to 10 ft. cut and 5:1 slopes.

The longitudinal grades of the runways were held to a minimum of 0.2%, and the lateral grades to 1.0% for 100 feet, there changing to 0.5% grade to the inlet basins. The flat grade of 0.5% was used to minimize over-run in cut. The areas between runways and taxiways are graded, and conditioned for emergency and safe landing of small aircraft. The side slopes or berm slopes are graded away from the conditioned area at the rate of approximately 7 to 1, depending on the contour of the ground and accessible material. These slopes are seeded with dwarf millet, 45 lbs. to the acre, for protection against erosion. Grading and drainage on the immediate layout have been so designed as to not only provide amply for present construction but also to fit in with future extensions and developments.

The drainage design was computed on the basis of the formula: $Q = \frac{AIR}{T+t}$. The rainfall assumed for this area is 2.5 inches. The run-off coefficient I used was, for paved area, 0.9, and for grass area 0.3; one inch rainfall per hour to be removed in two hours. A value of $n = .015$ was used in calculating the sizes of the sewers. Where possible, grades of pipes were held to 0.2% and open ditches from 0.3%, excepting the tidewater canal. The drain lines consist of about 17,000 lineal feet of 12-inch to 42-inch diameter pipe, to which are connected 56 inlet basins. The inlet basins are of four types as follows: Type A, single 20″ x 35″; Type B, double 20″ x 70″; Type C, single 51″ x 35″, and Type D, double 51″ x 70″.

The subgrade of the runways was constructed with

f Fernandina, Florida

Although located on the ocean, safety from storms required drainage west to a river through a tidewater canal. Artificial subgrade and substantial base support a plant-mixed asphalt pavement.

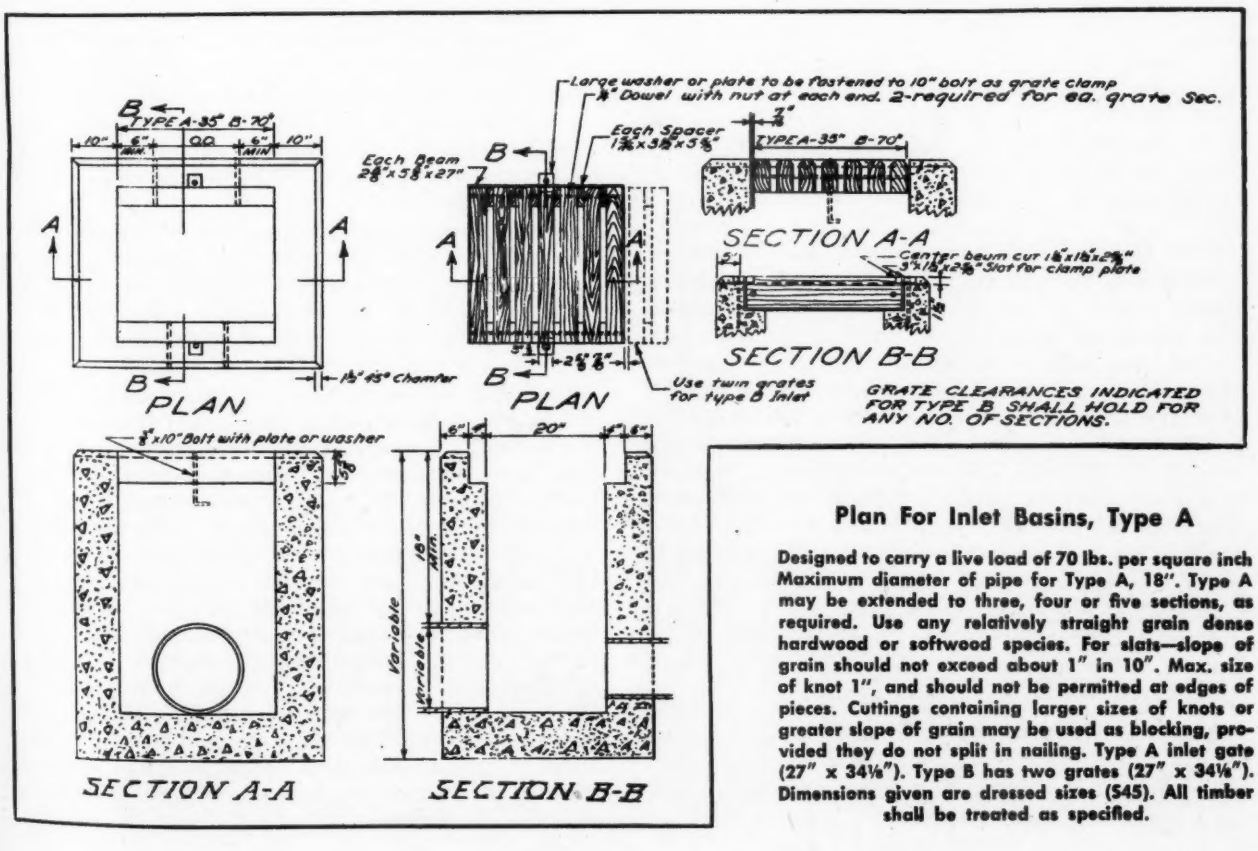
a mixture of sand and of hardpan which contained sufficient clay to make a well-stabilized subgrade and of which unlimited quantities were obtainable on the site of construction area. (The City of Fernandina has used this material for constructing miles of highway.) All materials used in the subgrade of the paved area had minimum bearing value of 35 lbs. per square inch as determined by Florida Bearing value test. Using a traffic pneumatic roller and a 10-ton tandem roller, the subgrade was rolled to a density of 97% of its maximum dry density as determined by the Proctor method. It was then primed with priming oil, grade RT-3, applying .3 gallon per square yard, approximately 135,000 gallons being used.

With the high ground-water table and precipitation, it was necessary to put down a substantial base. The base course, 4-inch compact thickness, is plant-mixed bituminous, using 60-80 penetration asphalt. The aggregate consisted of 50% local sand and 50% Camak screenings from Camak, Georgia. The gradation is as follows:

SIEVE SIZE	PERCENT PASSING
3/8"	100
No. 4	97
No. 10	87
No. 40	68
No. 80	38
No. 200	6

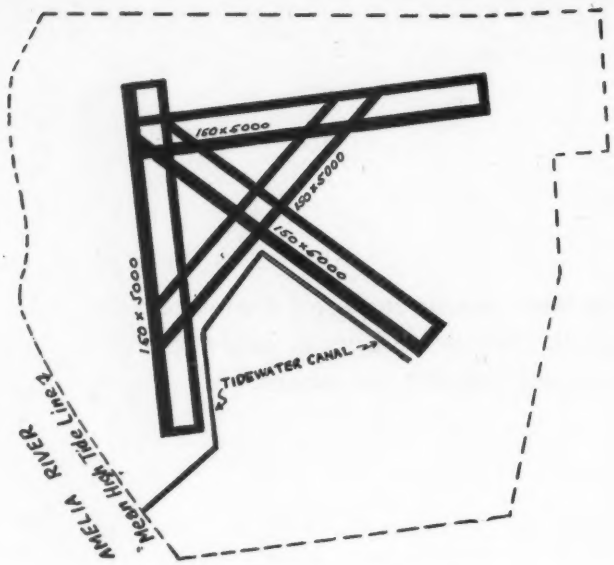
This aggregate was mixed with 5½% of asphalt at a temperature of 300 degrees. Approximately 85,000 tons of the aggregate was used, and about 1,350,000 gallons of asphalt.

The top course is 1½" thick using 6-8% of asphalt of 85-100 penetration. The aggregate consists of about one-third Camak, one-third Crystal river screenings and one-third local sand, with the following grading:


Large washer or plate to be fastened to 10" bolt as grate clamp
4" Dowel with nut at each end. 2-required for ea. grate Sec.
Each Spacer
Each Beam
TYPE A-35" B-70"
SECTION A-A
SECTION B-B
PLAN
PLAN
Use twin grates for type B Inlet
GRATE CLEARANCES INDICATED FOR TYPE B SHALL HOLD FOR ANY NO. OF SECTIONS.
Variable
20"
SECTION A-A
SECTION B-B

Plan For Inlet Basins, Type A

Designed to carry a live load of 70 lbs. per square inch Maximum diameter of pipe for Type A, 18". Type A may be extended to three, four or five sections, as required. Use any relatively straight grain dense hardwood or softwood species. For slats—slope of grain should not exceed about 1" in 10". Max. size of knot 1", and should not be permitted at edges of pieces. Cuttings containing larger sizes of knots or greater slope of grain may be used as blocking, provided they do not split in nailing. Type A inlet gate (27" x 34⅛"). Type B has two grates (27" x 34⅛"). Dimensions given are dressed sizes (S4S). All timber shall be treated as specified.



Layout of the Fernandina airport.

SIEVE SIZE	PERCENT PASSING
⅜"	91-100
No. 10	57-85
No. 40	26-64
No. 80	14-43
No. 200	5-10

There was about 35,000 tons of aggregate used and 630,000 gallons of asphalt.

The turn-arounds and intersections will have the following mixture to prevent cutting out in hot weather:

SIEVE SIZE	PERCENT PASSING
¾"	100
½"	82-100
⅜"	70-90
No. 4	55-79
No. 10	40-67
No. 40	17-44
No. 80	9-29
No. 200	3-8

With this, 5-7% of asphalt cement will be used.

There will be approximately 8,500 tons of this last material used. The entire paved area will be sealed with RC-2, and topped with coarse sand. The entire ground area will be seeded and the airport proper will be enclosed by a steel wire fence. At this writing (January 15th) it is expected that, if the weather is favorable, the construction will be completed before the end of February. During the first half of January several successful emergency landings were made upon the completed runways.

After the airport has served its purpose from a military standpoint, it will take its place among the commercially operated airports. This will give access and availability to Fernandina's industries, pulp mills, fisheries and canneries, and also to its beach, a fine resort haven in both winter and summer.

EDITOR'S NOTE.—Publication of this article has been held up by delay of Federal censor in approving same. On June 15th Mr. Drager wrote that the Civil Aeronautics Administration and the United States Navy accepted the airport on June 6th and it is now being used by the Navy.

California State Specifications for Painting Highway Structures

General Requirements. — These cover weather and temperature, the use of brushes and the provision of a mechanical paint mixer (or other means) to insure thorough mixing of the paint.

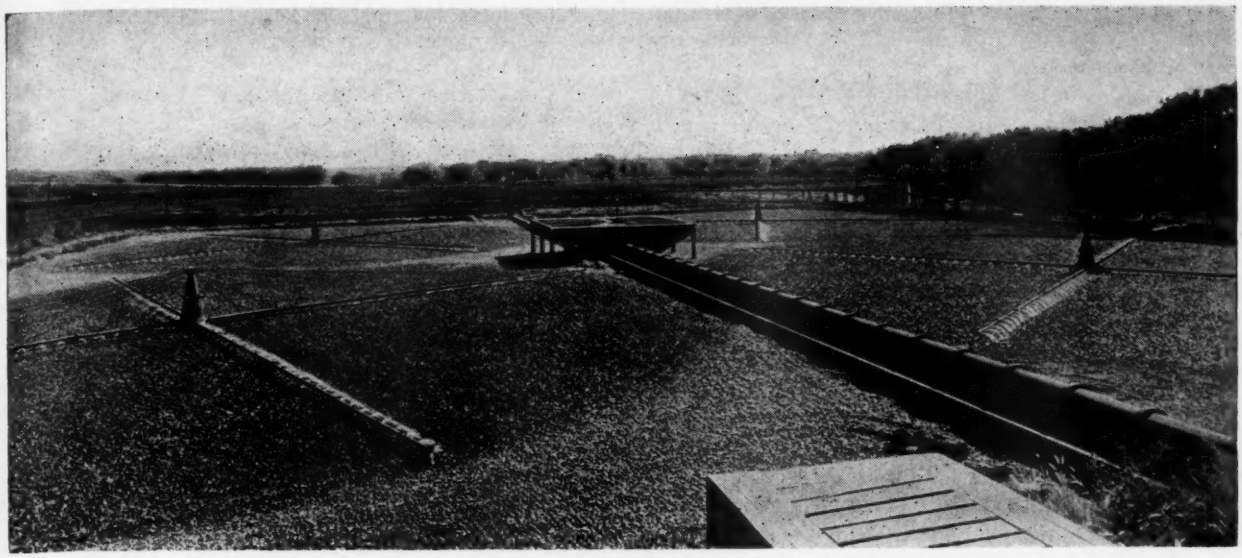
Thinning Paint.—If it is necessary in cool weather to thin the paint so that it will spread more freely, this shall be accomplished only by heating the containers in hot water.

Protection of Work.—The Contractor shall protect all parts of the structure against disfigurement by spatters, splashes, and smirches of paint or of paint materials. When paint is being applied on structures carrying public traffic, the Contractor shall be responsible for any damage to passing vehicles or persons and may be required to use canvas shields or other protective means to guard against such damage. Paint stains which might result in an unsightly appearance shall be removed by the Contractor at his own expense. If it is impossible to remove such stains, the Contractor shall coat the entire unit of work so stained with a suitable paint or wash until the stains are obliterated. When ordered by the Engineer, if traffic causes an objectionable amount of dust, the Contractor shall sprinkle the adjacent roadbed and shoulders with water at his own expense, for a sufficient distance on each side of the location where painting is being done, to eliminate dust and he shall furnish and post at his own expense DRIVE SLOWLY signs and take other necessary precautions to protect freshly painted surfaces.

Sand Blasting and Cleaning.—An approved sand blast apparatus shall be employed to remove all dirt, old paint, rust, stain, and other foreign matter from the steel portions of structures and sharp, dry sand shall be used. The Contractor shall provide suitable screens made by stretching muslin or similar material over frames, in order to protect highway traffic during sand blasting. Oil and grease shall be removed by the use of mineral spirits or turpentine; bristle and wood fibre brushes may be used for removing loose dust; upon permission of the Engineer, brushes, scrapers, chisels, hammers, and other effective means may be employed when necessary, but sand blast shall be used wherever possible.

No larger area shall be cleaned in advance of painting than will permit painting before rusting begins, and if cleaned surfaces rust before painting can be done, they shall be recleaned by the Contractor at his expense, so that the first coat of paint may be applied to absolutely rust-free surfaces.

Special Stenciling.—The date (year and month) of painting shall be stenciled on all steel structures, the under-clearance shall be stenciled on undergrade crossings in a position which will be clearly visible to traffic and the bridge number shall be stenciled on all structures. The stenciling shall be done with letters or figures two inches high and the paint used shall form a distinct contrast with the background. The stencils shall be furnished by the Contractor at his own expense. The figures or letters shall be stenciled in the position indicated on the plan or as directed by the Engineer. The cost of furnishing materials and labor to perform the work of stenciling shall be considered as included in the price paid for other items of work and no additional allowance will be made therefor. *California Department of Public Works, Division of Highways.*



Rotary Distributors at Sioux Falls, South Dakota, replacing original fixed nozzles.

Supreme Court Decision Relating to Industrial Waste Treatment in a Municipal Plant

By GLEN J. HOPKINS

Acting Director, Div. of Sanitary Engineering, South Dakota State Bd. of Health

A city cannot contract with a private party guaranteeing to continuously treat its waste waters successfully, or to dispose of all the sewage sent to it by such party.

A SUIT was instituted by a private citizen against the city of Sioux Falls, S. D., its governing Board of Commissioners and against a packing company, seeking to have declared invalid a certain contract entered into in 1926 and amended in 1940 between the governing board of the city and the packing company, relating to the disposition of packing house wastes through the city sewer system and treatment plant. The suit further sought to obtain an injunction restraining further use of the city system and plant for disposal of the company's industrial sewage. The trial court denied injunction and held the contract valid. The plaintiff appealed in the State Supreme Court, which court ruled the contract invalid but denied the injunction. (Supreme Court of the State of South Dakota; April, 1944, O. Charles Erickson vs. City of Sioux Falls, et al.). Certain aspects of this decision are of interest to those concerned with industrial waste treatment as well as those concerned with public health.

The contract referred to was made under the following conditions: The city wished to lay a sewer over and build a sewage pumping station on lands of a realty company, which leased a packing house and land to a packing company, and which permitted the use of its land by the city with the understanding that the packing company could discharge its wastes into the sewer, after first passing it through a fine screen and sedimentation tank and skimming off the grease, and should pay its share of the cost of pumping and of certain fixed and operating charges. In time the amount of grease reaching the treatment plant became so great as to greatly reduce its efficiency, and in 1940 the city and the company entered into a contract for improving the plant after plans made by Greeley & Hansen, whereby the company would pay 75% of the cost of rehabilitating the filters, install degreasing equipment, pay 85% of the cost of an equalizing tank and 100% of the cost of a gas engine-driven blower and generator at the treatment plant; the whole estimated to cost $70,600; also to pay $2,500 annually as part of the operating costs.

The following excerpts are from the decision of the Supreme Court:

"SDC 45.0112 provides 'Any citizen and taxpayer residing within a municipality may maintain an action or proceeding to prevent, by proper remedy, a violation of any provision of this title.' The title referred to embraces the whole field of municipal government. By reason of this statute, a resident citizen and taxpayer is authorized to test in court any ordinance, resolution or contract executed by the municipal authorities in any case where the validity of such action is challenged.

"The statutes provide that the governing body of the city is vested with the police power to preserve the public health and welfare and the proper disposition of sewage is essential to this public health and welfare. Where, as here, the statute expressly confers upon the city the power to regulate the use of sewers, and neither defines the limits of that power nor prescribes the manner of its exercise, the city is necessarily invested with

power to exercise its discretion, and the courts will not interfere with such action unless it appears to be unreasonable or arbitrary.

"The only privilege which a city can grant to a person or firm within its city limits is a license or permit to make proper connection and empty sewage into the system, there to receive such treatment and disposal as the city may from time to time provide. It is not within the power of a city to guarantee that it will successfully operate a sewage disposal plant or an adequate system. If the system or disposal plant must be closed for repairs or fails for any reason to receive or adequately purify the sewage emptied into it, the city cannot be held liable for resulting damages to any person whose sewage is thereby inadequately treated or excluded. It follows that a city cannot by contract assume any such liability, or bind itself to receive and dispose of all the sewage which patrons may attempt to empty into it.

"The supervision and regulation of the sewers is a police function of the city. Therefore, in granting permission for the use of the sewers in the first instance and for the continuing use thereof, the city must at all times retain control, and any attempt by way of contract to deprive the city of that control is void. The police power of the city cannot be bargained away by contract, but must at all times be available for use to meet such public needs as may arise.

"Any license or permit to connect with the city sewers must necessarily at all times be contingent upon the ability of the sewage system and disposal plant to digest and dispose of the same. No one has any vested rights in the use of the sewers, nor can the city grant such a vested right.

"If for any reason the system or plant will not handle sewage from a particular source, by reason of its nature or quantity, or if such sewage is of such character that it prevents the disposal plant from functioning, it is within the power of the city to require such sewer connection to be discontinued and it may be the duty of the city to do so. It may be necessary for the city to do so to protect itself against possible damage suits for the creation of a nuisance.

"In short, a permit or license to make a sewer connection granted by a city means only that the licensee is permitted to empty its sewage into the system so long as the system will take care of it and the city authorities permit. In the exercise of its discretion, which the courts will not interfere with unless the action is clearly unreasonable and arbitrary, the governing board of the city may grant and revoke licenses or permits as may be warranted by the capacity and ability of the sewers and disposal plant to dispose of the same, and as the public interests may require.

"By the contract as amended in 1940 the city authorities undertake to grant to the packing company the right to empty all of their sewage without limitation as to the character or volume, into the city system for the period of 15 years. The city does not grant to an individual householder any such contract for a period of years, nor does it assume any obligation or possible liability, but merely grants the privilege of connecting to the sewers, and it is a license which may be revoked for sufficient cause at any time. The contract purports to grant far more than is embraced in the license or permit which the city is authorized to grant. Were it valid, it might form the basis for a damage suit against the city for non-performance. It attempts to grant a vested right for the 15-year term. The city cannot assume such liabilities, nor grant such rights.

"The mere fact that one has expended considerable money to make the connection gives him no vested right to retain the connection.

"The contract between the city and the company seems to treat the sewage disposal plant as property subject to joint control, a sort of partnership affair, to be supervised by engineers paid by and owing allegiance to both parties. The law does not authorize such. The plant belongs to the city. The city cannot part with any of its control thereof, nor should it share the allegiance of any of its employees. The company is not compelled to use it. It may use it only by permit from the governing board of the city. If the company wishes to use the city plant, it must conform to the requirements which the governing board may lawfully impose.

"In dealing with the city as it has in the past, beyond its authority to contract, the company acquired no rights. The city suggests in its briefs that the money it has received from the company may be justified as voluntary contributions. The city may accept them as such. It should be clearly understood, however, that any such past or future payments neither impose liability upon the city nor confer vested rights or supervisory control upon the company.

"We do not think that it follows as a necessary consequence that injunction must issue to restrain further use of the sewers by the defendant company. While the contract before us did not confer the vested rights nor impose the obligations and liabilities which it sought to do, the governing board did authorize the making of the sewer connections which have now been in use for over 15 years. The very existence of the connections implies the existence of a permit which, as we have said, can be revoked by the governing board in the exercise of its sound discretion at any time. Or, the city can grant a new permit at any time. The duty of seeing to it that the sewage originating within the city is disposed of in a proper manner rests upon the governing board. The issuance of the injunction prayed for herein might deprive the city, at least temporarily, of its power to discharge this duty. Where, as here, the injunction prayed for could be promptly nullified by the issuance of a new permit; where a discontinuance of the sewage outlet through the disposal plant, if continued in force, might either jeopardize the public health or greatly injure the public interests, we think the issuance of the requested injunction is properly denied."

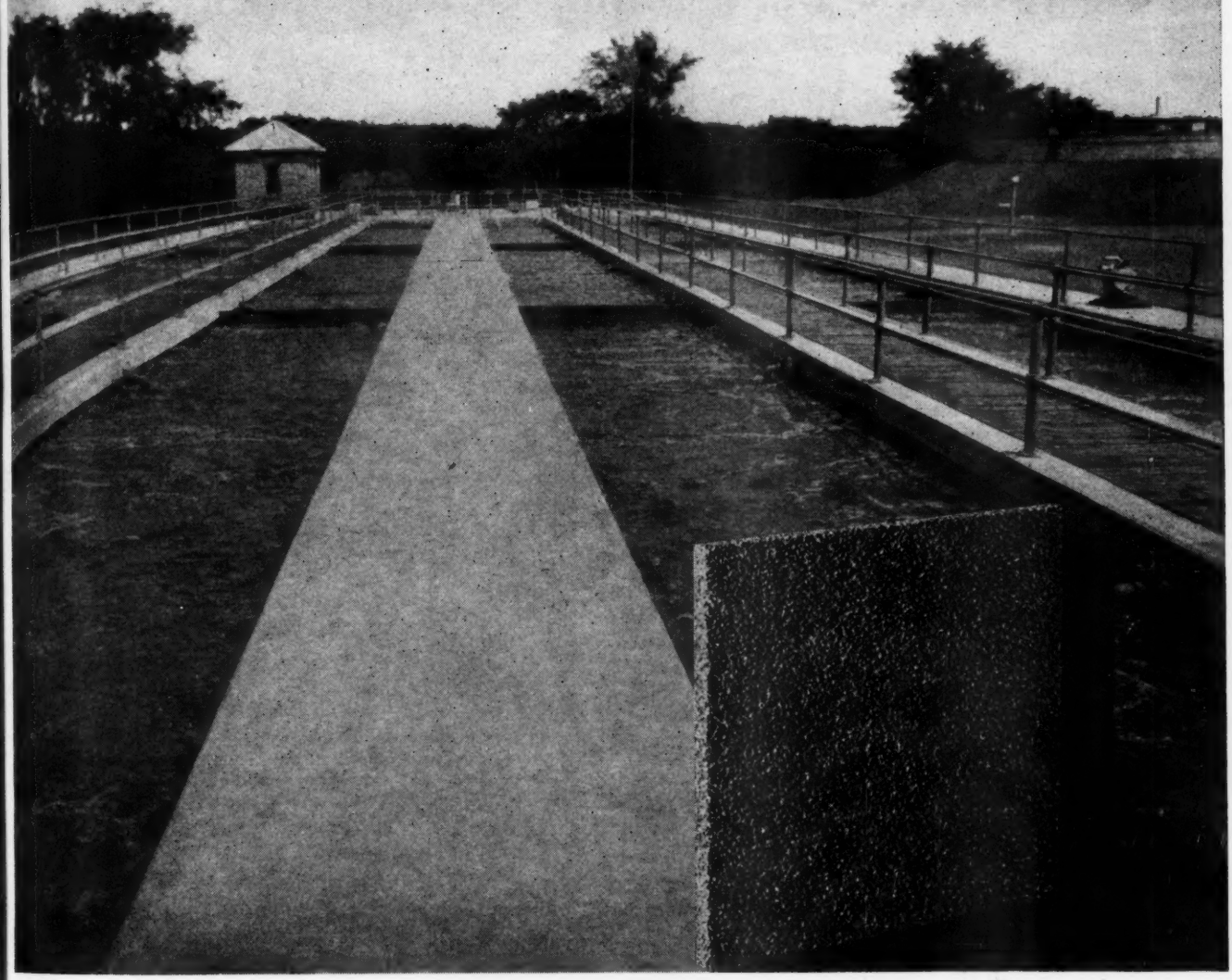
Note by the Editor:

Sioux Falls, S. D., with a population in 1940 of 40,832, built in 1935 a treatment plant designed for 120,000 plus industrial wastes with a population equivalent of 36,000. This plant included coarse screens, grit chambers with continuous removal mechanism, mechanically equipped settling tanks, trickling filters with fixed nozzles, activated sludge tanks with diffused air aeration and mechanically cleaned humus tanks, and sludge digesters with stirring mechanism, the gas being collected and used in gas engines with heat as a by-product. The sludge was drawn onto sludge beds or lagoons. In addition, the packing house wastes were treated by chemical precipitation with a flocculation tank using mechanical agitation, and sedimentation in mechanically equipped settling tanks.

In 1941 the plant was revised, chlorination by liquid gas being added, and a gas holder. Last year the fixed nozzle distribution on the trickling filter was replaced with four Dorrco rotary distributors, each 197 ft. in diameter. The illustration shows how these were set to

(Continued on page 28)

Norton Porous Plates for Efficient Sewage Disposal



Aeration is the heart of activated sludge sewage plants, and more Norton Porous Mediums are used in this operation than any other make. Over 54 years' experience in ceramic product development and the longest experience in the manufacture of fused alumina products stand behind Norton Porous Plates and Tubes. For efficiency in diffuser operation demand Norton Porous Mediums for uniform air distribution, great strength, regulated wet pressure loss and long service.

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NORTON Longer Lasting POROUS MEDIUMS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Safety in the Engineering Design of Highways

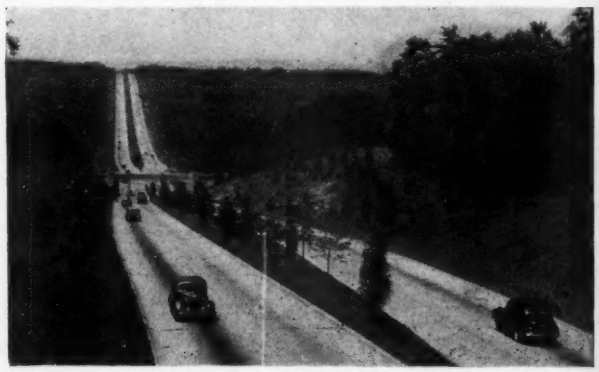
By H. G. SOURS
Ohio State Highway Director

Advantages of multiple lanes and limited access in facilitating safe driving. Widening narrow roads. Abstracts from a paper before the 1944 meeting of the Eno Foundation for Highway Traffic Control.

A HIGHWAY department should have a separate Bureau of Traffic and Safety. Most state highway departments have made good progress in this direction. The functions of a Traffic and Safety Bureau are many. To handle safety design, there should be specialists in this type of work who should review and prescribe safety treatment on all projects when they are in the preliminary stage of design. While a progressive Design Bureau will always have some engineers well trained in safety features of design, special treatment and special problems can best be prescribed and handled by those who specialize in this field. It is always well to have a skilled Traffic Engineer check plans before they are completed.

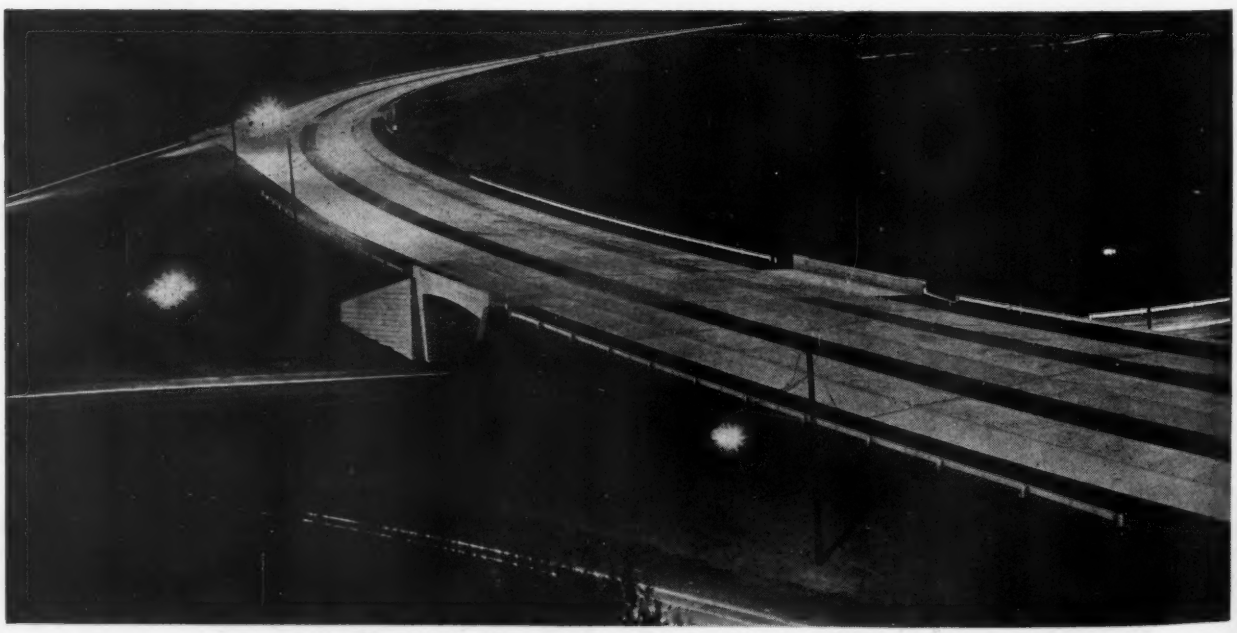
With changes in speed, in widths of vehicles and volumes of traffic, standards of lane widths have increased from 8 to 10 ft., and now safety requires 11 and 12 ft. on main highways.

On heavily travelled roads, excessive shoulder maintenance costs can be reduced by wider pavement lanes. Many old pavements are now being salvaged by widening to standard lane widths and resurfacing. A narrow and rough pavement is dangerous. Widening and resurfacing, with some grade and line correction and curve super-elevation, make a much safer road and at a nominal cost preserve the investment for many years.



Merritt Parkway, Connecticut. Thirty miles long with 4 lanes divided. No commercial traffic allowed. Grade separation structures at all cross roads and railroads.

Multiple Lanes. The three and four-lane pavement came as a simple outgrowth of the need for more traffic capacity. For slow moving traffic, the three and four-lane undivided type served reasonably well and still does where the abutting property is developed and



Interurban section of an express highway.

HEY! LEAVE THAT "PUTT-PUTT" ALONE

No soldier, you don't have to monkey around with that Homelite Portable Gasoline-engine-driven Generator.

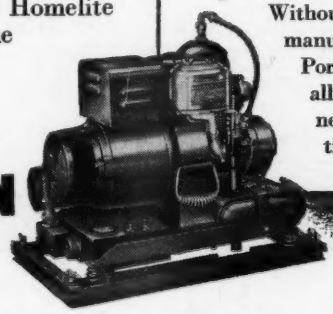
You don't have to check the oil level . . . the oil is mixed with the gasoline and fresh, clean oil sprays over all moving parts at each revolution. For the same reason, there's no need to shut-down the unit to change oil . . . there's no oil sump to collect sludge.

The engine is air cooled . . . so there's no water level to be checked.

No adjustments are required when the load on the generator changes . . . a simple built-in governor automatically keeps the engine at a constant speed.

When it comes to operating electric tools, floodlights, landing field marker lights, or even radio equipment . . . this simplicity of operation has proved an important advantage to all the branches of our armed services. Less time is required to keep the Homelite generators operating . . . more time can be given to the number one job . . . winning the war.

You don't need an expert to run a Homelite Portable Generator. It's as foolproof as possible. Send it out on any repair or emergency job and tell your men to set it up . . . start it . . . and leave it alone. Without any fussing around or manual attention, your Homelite Portable Generator will give you all the dependable power you need to operate floodlights or time-saving electric tools.



HOMELITE CORPORATION

PORT CHESTER, NEW YORK

Limited access highway in Chicago.

there is need for access at many and closely spaced intervals.

Where high speeds prevail on heavy traffic roads, the divided type providing for separation of opposing traffic is unquestionably the proper design, from both a capacity and a safety standpoint. A four-lane divided highway with eleven or twelve foot lanes is the generally accepted standard. The width of the median strip may vary with conditions; cost of right-of-way and damages, topography, etc., being some of the factors which must be considered in determining median widths. Three lanes in each direction are used in a number of urban areas and in a few cases more. Generally, not more than three lanes each way is recommended.

The need for multiple lanes oftentimes can be more intelligently determined on the peak load traffic information than on the average daily traffic. The highway with a reasonably good hourly distribution of traffic may be much safer and more satisfactory to travel than one with a smaller average daily traffic but subject to high peak loads at certain hours.

The three-lane road still meets with some favor in certain places, principally where the directional flow of the heavy volume of traffic is reversed at certain peak hours. It is a dangerous type for high speed traffic, especially where the sight distances are short.

A road carrying a considerable number of mixed fast and slow moving vehicles is dangerous. The worst condition exists on long grades where trucks naturally slow down. A third lane added to the outside and ascending side of the two lanes is a decided addition to safety and convenience, provided the slow moving vehicles observe the rules of the road. The same treatment can be recommended at intervals on flat grades where mixed traffic is up about to the limit of a two-lane road.

Speed is the controlling factor in determining safe sight distance. For high speeds it ranges usually from 1,000 to 3,000 ft.

Shoulders should be all-weather, sufficiently wide to permit vehicles to leave the pavement completely when necessary to stop, and of a type contrasting with the pavement.

Limited Access. The most urgent problem today and in the immediate future in many states is that of providing, in the urban areas, particularly those of metropolitan character, adequate traffic facilities which will collect, carry and distribute large volumes of traffic quickly and safely. In many such areas the peak hour problem has almost hopelessly snarled traffic on the existing facilities. Limited access or express ways provide the logical solution. The progressive highway engineer, planner and designer will waste little time in the future in trying to solve major urban arterial problems through the means of street widening. Major street widening projects usually involve disproportionately high right-of-way and damage costs and the functional advantages gained are often disappointing. We still have the interruption of traffic by intersecting streets; we merely increase the number of lanes but not to any great extent the speed or even the safety.

Express ways entering cities should be located on either blighted or undeveloped property as much as possible, leaving the existing streets to serve local traffic. Intersections and interchanges should be limited to the principal collection and distribution points. Grade crossings, both railroad and highway, should be separated.

Ribbon development can be avoided through limited access. Merely relocating a main highway through undeveloped areas only defers local traffic interference if roadside or ribbon development is permitted to spring up along the new location.

The highway planner must not only bring the traffic into the city on an express route, but must also so plan that the express way can be unloaded and the traffic properly distributed without congestion when it reaches its destination. Careful origin and destination studies provide the necessary information to make the proper decisions on this question.

Express routes between major centers of population or the so-called rural trunk roads involve the same general principles as in the urban areas. However, modifications can be considered, such as strict limitation of access, grade separations, etc., when the cost and the need are carefully weighed against each other. In many cases as in urban improvement, the highway can be more satisfactorily and economically located on an all new location, leaving the old road to serve local traffic and existing developed property.

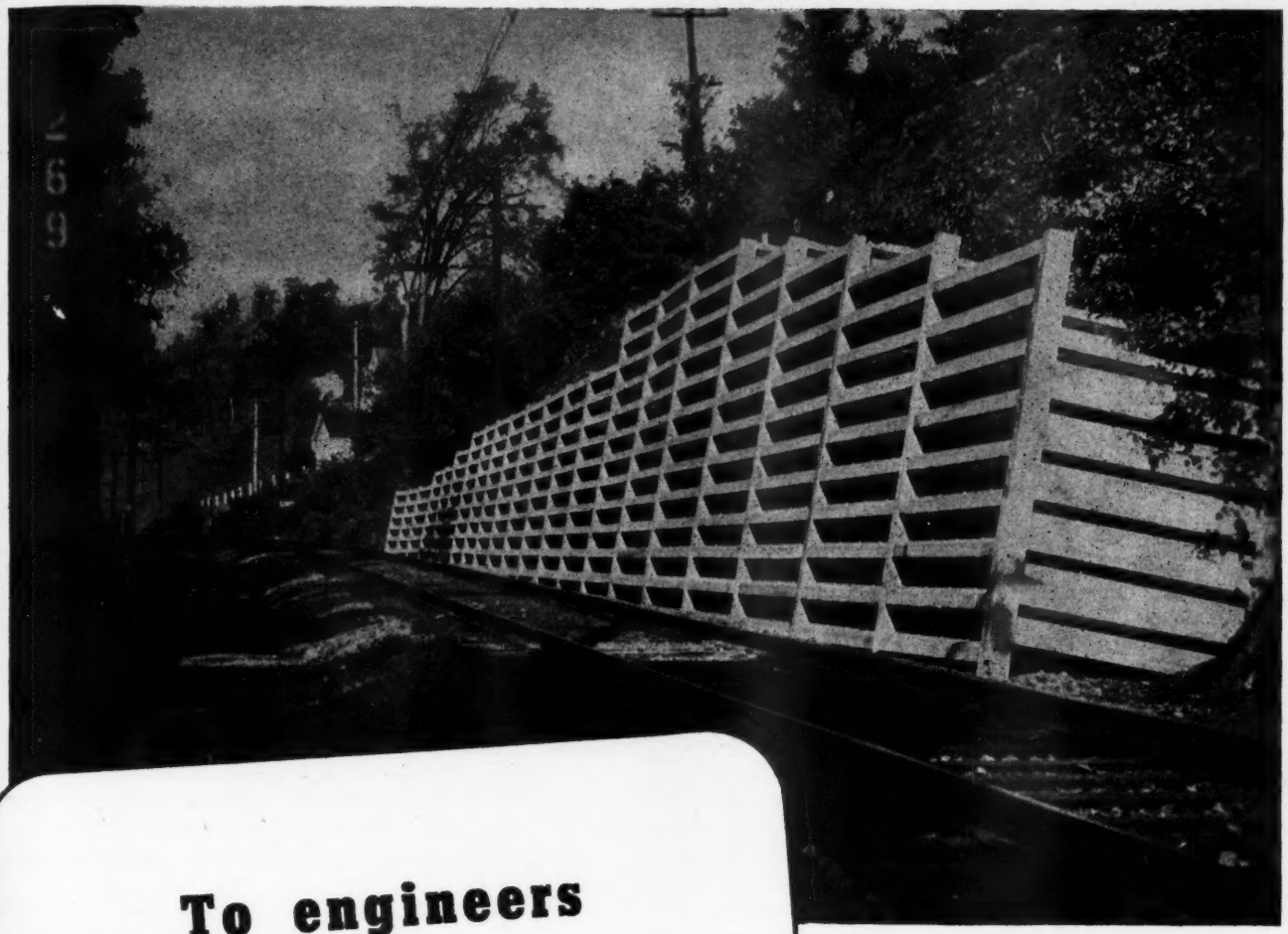
In some cases the existing road, if in good condition and reasonably well located, can be preserved and used for one-way traffic. Right-of-way can then be acquired parallel and adjacent to the old road for a new pair of lanes. The median strip under such conditions may vary considerably in width and the grades may differ. This is especially true in rough country where the topography does not readily lend itself to wide graded sections on the same level. In some cases bypass routes should be planned to siphon off the through traffic approaching the large cities. In some respects, bypassing of the smaller cities is even more important due to a higher percentage of through traffic.

Industrial Waste Treatment in a Municipal Plant

(Continued from page 24)

utilize to the best advantage the old filter bed, the dosing tanks being set in the center of the bed, in the neutral zone between the four distribution circles. While this arrangement does not utilize the entire area of the old filter bed, the more uniform distribution inside the areas of the circles undoubtedly more than compensates for this.

Another new feature is the rearrangement of piping to conform to the Bio-filtration method of treatment.



Space was at a premium for widening a highway above this railroad cut. The answer was an ARMCO Bin-Type Retaining Wall to prevent encroachment of the slope upon the track.

To engineers who are planning the "BATTLE OF PEACE"

America will need your plans. Millions of fighting men and other millions of war workers must some day turn to new jobs in a new and different world. You can help by planning now to avert a serious let-down when Victory is won.

No doubt you are thinking about many projects that would not only improve roads and streets, but even more important would provide jobs for returning service men and workers now in war industries. Even now industry is planning post-war developments to absorb its share of these people. If federal, state and municipal governments have their plans ready, unemployment will be less of a problem to America.

* * *

In this "board work" you may need a practical solution for unstable slopes, rights-of-way and similar problems. Remember ARMCO Bin-Type Walls for their ability to overcome unequal settlement without cracking or bulging.

So include ARMCO Walls in your plans for the future even though you can't get them for immediate construction. Right now tanks, guns and ships are most important. Armco Drainage Products Association, 365 Curtis St., Middletown, O.

ARMCO Bin-Type RETAINING WALLS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Acid Treatment of Wells at Naperville, Illinois

Description in detail of how a deep well pump, whose capacity had been lowered from 670 to 390 gpm by encrustation, was completely restored by use of hydrochloric acid, and pumping cost reduced $1,700 a year.

By J. A. SHIMP
Assistant Superintendent of Water Dept., Naperville, Ill.

THE pump and well under discussion consisted of 79 ft. of 8 in. flanged eduction pipe; 7 ft. 9 in. of pump bowls; 29 ft. 4 in. of tail pipe, and 5 ft. 8 in. of suction screen. The total depth from which water can be pumped before it is pulled down below the screen is 112 ft. 4 in. When installed, this pump delivered 670 gpm against the pressure in the distribution system and an elevated tank. Afterward an iron removal plant was installed, and the pump lifts the water into this, a total head of about 10 ft. over the floor.

In 1943 the pump could not deliver over 390 gpm without drawing down the water below the suction screen, and it was decided to try cleaning the screen. First a capacity test was run on April 1st. The pump was turned quarter way around on its base so that it could discharge to waste outside the building, and an 8″ pipe, with valve and fittings, connected to the discharge. At the end of this pipe was fastened a steel plate containing a 5″ circular orifice, and the head on this was measured by means of a glass tube piezometer. A gauge is attached to the base of the pump, from which a ¼″ brass pipe extends into the well to a depth of 104 ft., by means of which the height of water in the well from the bottom of the brass pipe can be measured at any time.

When the test was started the water stood at an elevation 7 ft. 3 in. below the floor, but was pulled down below the suction screen if the rate of pumping was increased beyond 390 gpm.; this being demonstrated by several hours of pumping.

After the test, the pump was removed from the well and it was found that both inside and outside of the pipe and pump were badly encrusted with a rust-colored deposit. The pump bowls were taken apart and thoroughly cleaned by immersion in a bath of hydrochloric acid and scraping. Also all the piping was scraped and cleaned. The line shafting is of special stainless steel and was in perfect condition.

In preparation for treating the well, a steel plate was welded into the top of the casing and two vertical 2″ wrought iron pipes passed through and welded to it; one of them extending to the bottom of the well, the other one just through the plate and fitted with a pressure gauge; each pipe being furnished with a valve.

On April 6th there was delivered at the site, in two tank trucks and a trailer, 3,000 gal. of 15% commercial hydrochloric acid mixed with an agent to prevent it from damaging the pump and piping. The acid was pumped into the bottom of the well through the 2″ pipe in about two hours. The pressure created by the action of the acid was greater than expected and foam came up around the casing and spread over the pump house floor; without causing any damage, however. The 2″ pressure pipe had been provided for pressure relief but it was necessary to use the other one also.

The acid remained in the well over night and the next day the pump was reinstalled and tested as before, pumping being resumed at 7:15 P.M. At the start the water stood 3 ft. 9 in. below the floor—3 ft. 6 in. higher than at the first test; indicating either that there still was some pressure from the acid, or that the static level was higher. The water coming from the well was rust red at first, gradually turning to a milky color, which indicated that there had been considerable action of the acid on the limestone walls of the well.

The following table shows different rates of pumping and the number of feet the water was drawn down in the well:

Rate of Pumping	*Drawdown*
650 gpm	23 feet
700 "	26 "
700 "	29 "
750 "	33 "
760 "	34 "
790 "	36 "
800 "	38 "
825 "	41 "

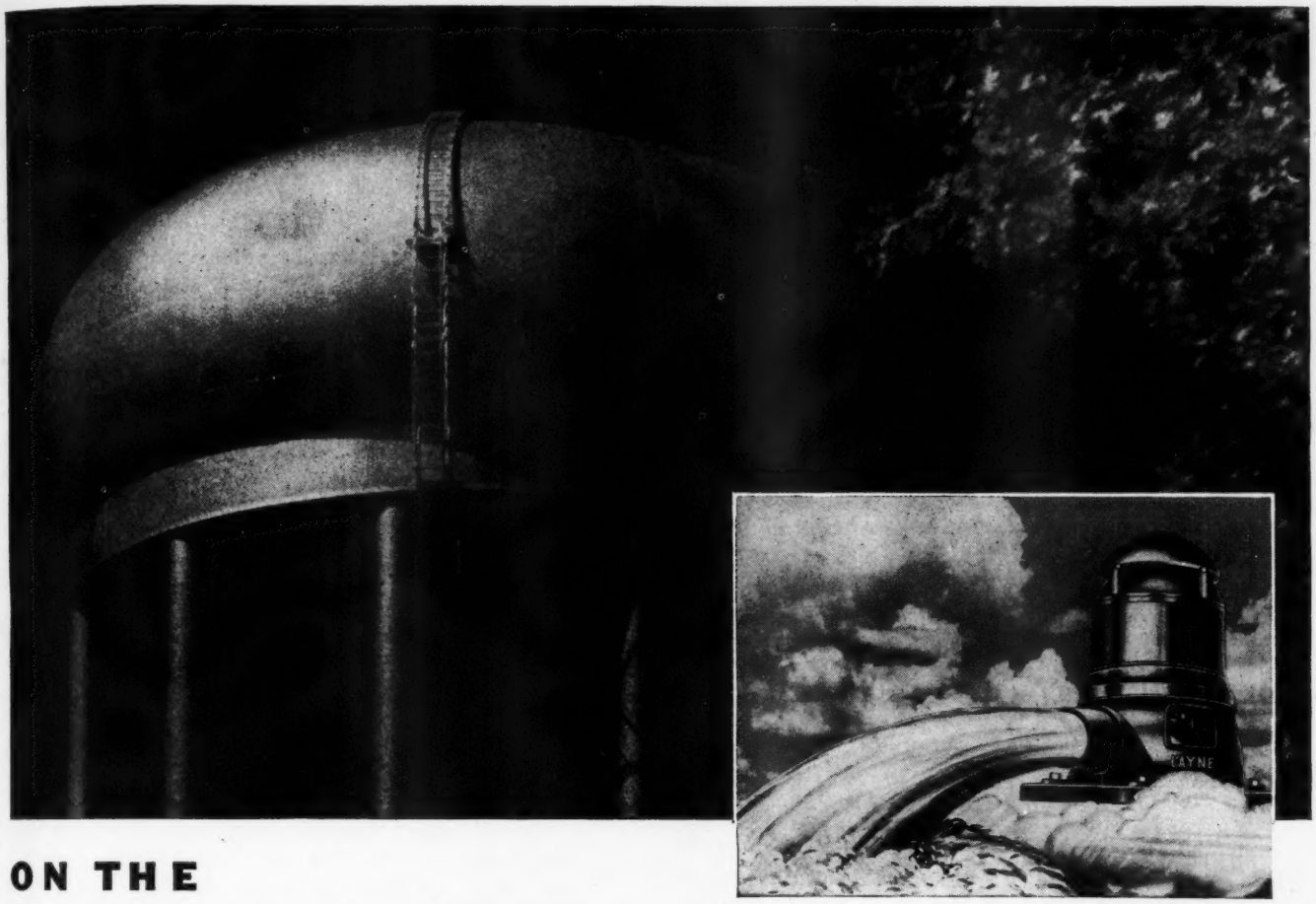
During the test, the pump was stopped and started several times to surge the well and clean out as much deposit as possible. The test was discontinued at 12:00 o'clock as all necessary data had been obtained.

The next day, April 8, the pump was again started and pumped to waste until the water was entirely clear, and was then reconnected with the permanent piping and put into service.

The results gained were very gratifying and show conclusively that this was an economical and efficient method of restoring the well to its original capacity.

The booster pump which delivers water from the detention basin through the filters has a capacity of 750 g.p.m., and the deep well pump can now be operated at that capacity, so that neither pump will gain on the other.

If the average daily consumption of water in the City is 400,000 gallons, it would require 17 hours of operation of the pump at 390 g.p.m., but at the rate now possible, 750 g.p.m., the operation is reduced to 9 hours. It requires 0.77 k.w. of electric energy to pump 1,000 gallons with this pump when operating at capacity, and the saving in pumping 9 hours instead of 17 hours is $4.68 per day, or a saving of $1,708.20 per year.



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And Around the Clock...

62 YEARS *of Water Producing Experience*

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Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va., Savannah, Ga., Orlando, Fla. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City and Pittsburgh, Pa. * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston and Dallas, Texas * Layne-Western Co., Kansas City, Mo., Chicago, Ill., and Omaha, Neb. * Layne-Western Co., of Minnesota, Minneapolis, Minn. * International Water Supply, Ltd., London, Ontario, Canada.

Time means nothing to a finely engineered, sturdily built and properly installed Layne Well Water System. Throughout the twenty-four hours of each day it must be in perfect, and thoroughly dependable, working order. A sudden water failure could bring disaster.

Layne Well Water Systems—thanks to more than sixty years of world-wide experience, are as near failure proof as human skill, manufacturing honesty and quality materials can make mechanical equipment. Even the metals used in contact with the water are varied to assure longer life where corrosive conditions are encountered.

In addition to sturdiness in build and quality of materials used, Layne Well Water Systems and Layne Vertical Turbine Pumps are famous for their high efficiency. Such efficiency effects substantial savings each year.

To get all that you expect and must have in a dependable and long lasting water system, and to eliminate worry of failure, always choose a Layne Well Water System. Fully illustrated literature may be obtained by addressing Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

LAYNE

WELL WATER SYSTEMS
DEEP WELL PUMPS

When writing, we will appreciate your mentioning PUBLIC WORKS

Restoring Bridges After Washouts

Emergency work of county highway engineers in two states in restoring traffic after floods had wrecked bridges and washed out highways.

TO HIGHWAY engineers, severe floods are a hazard that often furnish the most severe headaches and thrilling experiences of their official life; especially to county engineers who have many bridges on their highway systems. Several of these have written us describing such experiences in cold, factual statements. We think others might be interested in reading some of these and comparing them with their own experiences, and we are giving two of them herewith. Asked for photographs of the work, one engineer replied that they had been too busy to think of taking photographs.

In Cherokee County, Kansas

Cherokee County is in the extreme southeast corner of Kansas with a population of 32,000. The County Highway Department has the responsibility of maintaining 1110 miles of county roads and bridges.

In the spring of 1943 heavy rains set in, finally reaching a peak when late in May, we received twenty inches of rainfall in a few days. The heaviest damage occurred in the eastern part of the county, through which passes Spring river. Many county roads were completely blocked by the highest water ever recorded, rail service was suspended, innumerable small culverts washed out, and thousands of tons of gravel or chatt road surfacing material were washed away; even some sections of oil mat surfacing were torn out in large chunks. Three steel bridges, the largest of which had a total span of 429 ft., were destroyed.

Recognizing the fact that we were faced with an emergency, all available highway employees were organized into groups and each given a truck containing hand tools, rope, flares, barricades and road signs. Each truck was assigned to certain locations with instructions regarding the closing of roads, erecting proper signs, and assisting farmers where possible in rescuing livestock.

Some of the trucks hauled broken rock to fill washed-out culverts on important mail routes. In a few cases the rock completely blocked the channel, but served the traffic very well for a week or so until suitable culverts could be installed by the regular bridge crew.

At one of the bridges, the approach grade washed out, amounting to an estimated 500 cu. yds. of rock and gravel. However, the material was deposited in large windrows just below the approach site. One of our tractor drivers was given a Model S Allis-Chalmers tractor with a one-yard rotary scraper, and in about three days had the fill back in place with traffic resumed.

Soon, we could assign practically all available trucks to hauling resurfacing material, composed principally of "chatts," which is crushed flint rock about pea size and is available in huge quantities in the southern part of this county, being a by-product from the extensive lead and zinc mining field in that area.

In view of the shortage of all materials, it was particularly impressed upon all of our county employees to salvage everything possible, such as steel I-beams, bridge floor lumber, etc. Some of these salvaged steel I-beams were immediately cut into suitable lengths for temporary culverts. By searching along the banks of various streams, we were able to reclaim many undamaged bridge floor plank.

At the present time, all damages with the exception of two large bridges (to be built later) have been repaired and put in very good condition, considering the necessary war restrictions on critical materials.

Lloyd C. Belt, County Engineer.

In Clinton County, Indiana

In the northeastern part of Clinton County is the "Worder ditch," which was crossed by four bridges, all old; three of the "bedstead" type, supported on mud sills. In 1942 this ditch had been deepened, the contractor using a dragline, the new bottom being several inches below the mud sills. During the heavy rains of 1943, two of these bridges were washed out and two condemned, and all had to be rebuilt. Contractors then were scarce, labor was scarce and inefficient and wages high; so the commissioners asked me to do the work. Fortunately I have a splendid foreman and a very good group of highway men.

One of the bridges was on a very important road and immediate reconstruction was desirable. First it was removed by dynamiting, which was done by one of my men (who has a license for such work) and a helper. The resulting material was removed by dragline and trucks to fill road washouts. Soundings showed the necessity of pile foundations, so I took three men to a nearby woods and cut 30 pieces of oak and walnut piling 20 ft. long and 10″ to 12″ butt, which were hauled out with a tractor and all were at the bridge site in two days.

Meantime the dragline operator had rigged up a piledriver and the piles were driven in short order. Putting a dam around each abutment site, we dug down several inches below the bottom of the ditch and ran in concrete, forming a footing 4 ft. wide, rising a few inches above water level; placing two rows of ½ inch reinforcing spaced 12″ centers, with a 2 x 6 between to form, when removed, a key for the abutment.

The next day we began to build the form for the abutment and wings. When these had been poured we placed two 9″ I-beams 20 ft. long connecting the ends of the abutments (the span was 18 ft. and width 28 ft.), and between them eight 7″ I-beams spaced 3 ft. apart. Then the form for the 10″ concrete floor was placed, and several bars of ½″ deformed iron were woven between the I-beams to reinforce the floor. About 36 hrs. after pouring the floor we removed the form and spent several hours using a rich mixture of cement and rubbing with a sand stone until we had a smooth finish.

The county owns a one-bag Jaeger concrete mixer. I hired a Lorain dragline to do all the excavating and pile driving, which saved labor and speeded up the work. With the foreman, Mr. Bricker, and several good men, we saved the county about one-third the estimated cost by contract, besides completing it in a very short time.—*Carl V. Strong, Supervisor of Clinton County Highways.*

LANDMARKS

The old
and the new
share something
decidedly worth-while.

The massive skyscraper,
built to last . . .
The Ludlow Hydrant,
old in service
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LUDLOW HYDRANTS & VALVES
SINCE 1866

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Town Control of Billboards

The Town of Springfield, Vermont, is no lover of billboards. At a Town meeting in March it passed unanimously a measure prohibiting all advertising signs having an area of over 40 square feet. This will not affect business signs on property which pertain exclusively to the property itself, its sale, its rental, or business conducted thereon.

This town action finds its authority in the recent decision of the Vermont Supreme Court which, in upholding the state billboard law, declared that billboards have no inherent right to use the highways for advertising purposes. Pointing out that the billboards are essentially a use not of private property but of the public thoroughfare, the Court declared that if a state or a municipality enacts a law restricting, *or even forbidding* highway advertising, neither the property owner nor the billboard owner would be deprived of any constitutional rights.

This opinion from a State Supreme Court gives an entirely new angle to the whole business of billboard restriction. In Vermont it gives complete local option to cities, towns and villages, which may enact their own laws for the protection of their roadsides and streets from disfiguring commercial advertising. The Town of Springfield is the first to take advantage of the power granted.

At one time the Town of Springfield had seven large posterboards each measuring 300 square feet and all in scenic locations, three with the Connecticut river as a background. The removal of these was achieved by a constant stream of protesting letters from Springfield citizens sent to the business firms advertising on the boards. These letters became such a source of annoyance to the billboard owners that for their own protection they left the boards bare for months and finally removed them. The measure adopted at the town meeting will now prevent the erection of any more big billboards in Springfield.

The Vermont Association for Billboard Restriction, affiliated with the National Roadside Council, was responsible for the passage of the state billboard law which has already proved one of the most effective enacted by any state. The Association will now see that the opportunity for Town control demonstrated in Springfield is made known to the Selectmen and residents of many Vermont towns. It is expected that many towns located on main arteries of travel and which have seen these highways disfigured by billboards will follow the precedent established and, adhering to the principles of local option, will take similar action.

To Teach Safe Driving on the Highways

H. G. Sours, Director of the Ohio Dept. of Highways, has combined with Kenneth C. Ray, Director of the State Dept. of Education, to sponsor driver education in Ohio, since use of the automobile has become so much a part of American life. School courses in driver training will be introduced to take their places with algebra and geometry in many high school curriculums.

This conforms to the Ohio drivers' law which provides that the Bureau of Motor Vehicles may waive the examination of any person applying for a driver's license who presents a certificate that he has satisfactorily completed a course of instruction in driver training approved by the State Dept. of Education.

Military use of pre-induction driver training in the preparation of one out of every four soldiers in the U. S. Army for some form of motor transport duty, was pointed out by highway director Sours as proof of the value of civilian driver education as a means of reducing traffic accidents on the streets and highways.

"Improper driving is the major factor contributing to fatal accidents in motor vehicle operation," Sours stated. "Driver education is a forward step in meeting both military and civilian requirements for the reduction of traffic fatalities."

As a preparation for introducing this course, teachers were instructed in driver training at a Teacher Training Institute held at Ohio State University on June 14, 15 and 16.

Importance of Engineers in the War

In an address before the Associated General Contractors of America, Major General E. Reybold, Chief of Engineers told of the part engineers are playing in the war as follows:

On a recent trip to the South and Southwest Pacific, I saw at first hand the requirements of this air and amphibious war. When we move into a new island position, we start with nothing save a bare toe-hold. From this tiny beachhead, we have to build every improvement required for our troops. Always, it is a driving battle against time, to get the supplies moving, to strengthen our positions for the next thrust.

As assault waves are put ashore in amphibious landings, as at Lae and Salamaua on New Georgia Island, Engineers land under fire with their equipment to help organize the beach, to prepare shore roads, to establish communications, to develop unloading and distributing points, and to provide water for our troops.

The invasion phase of land operations is wound up with Engineers putting back into operating condition the port facilities—by providing such facilities where they have not existed. Without adequate docks and unloading equipment, the "heavy stuff" among the Army's supplies cannot be landed. The equipment and materials for port repairs must be brought in even while the ports are clogged with the heavy landings of troops and equipment. Earliest possible reconstruction of the ports of Western Europe will be an absolute prerequisite of successful invasion.

Yet the building of port facilities, great as that task may be, is but the beginning of the construction problem involved in landing operations. Supplies must keep pace with scattered fighting units. This calls for roads, railroads, pipelines and bridges. In this mechanized warfare, the bulk storage and distribution of fuel reaches amazing proportions. Tank trucks cannot be used to any great extent on the muddy and traffic-choked roads leading to the front. It is the job of our petroleum distribution companies to locate, construct and operate military pipeline systems as a means of supplying petroleum products to the front and to the airfields.

Engineers are also responsible for water purification and supply. We are equipped with portable units which can be set up immediately and put into operation for supplying troops, as well as civilians in occupied areas, with potable water. When we reached Naples, the entire city was without water. We gave it to them. We have restored electric power to many blasted Italian cities.

Air supremacy is our prelude either to sea or to land control. Our engineering and construction equipment give us an unquestioned advantage in building land bases, without which air power is ineffective. After

IMPORTANT

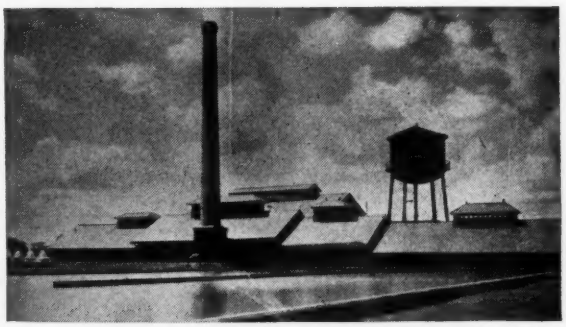
Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.



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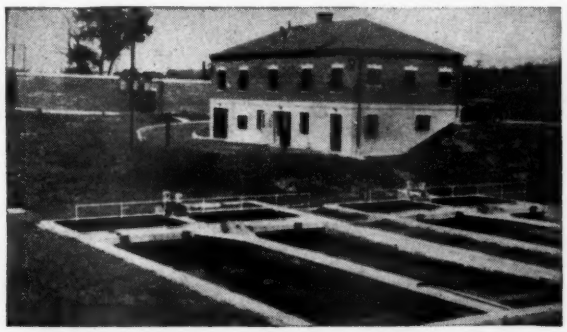
1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.



★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

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invasion, it is vital that we have landing strips immediately to give proper cover to our advancing troops. With bombs falling around them and machinegun fire sweeping their positions, Engineer troops have leveled, stabilized and surfaced landing strips in a matter of hours—hours that mean lives.

Added to the construction phases of invasion is the work of rehabilitating the "scorched earth" in the wake of the enemy. The Italian campaign is proving that he is becoming steadily more skilled in destroying airfields, roads, bridges, railroads, power houses, and everything else that might be of the slightest use to our troops. Our construction ingenuity is pitted against the ruthless cunning of German demolition crews.

California Guards Against Malaria

As yet there is no reason to believe that tropical malaria may gain a foothold in California, although sporadic cases are almost certain to occur. Steps are being taken to extend and strengthen the program for control of malaria-bearing mosquitoes in California. For practical purposes, the area that might be regarded as potentially dangerous is in the great valleys of the State from Shasta to Kern.

The continued return of service men who are ill of malaria increases the case rate for this disease to a certain extent but the rate among civilians is only slightly higher than the minimum for the past 20 years. In fact, the malaria case rate for California at the present time does not compare with the rates that accompanied the influx of individuals from the southern States a few years ago. Nevertheless, the department will maintain a close watch over the trend of malaria in California lest the continued influx of cases in service men from Pacific war zones should promote an increase in the prevalence of the disease.

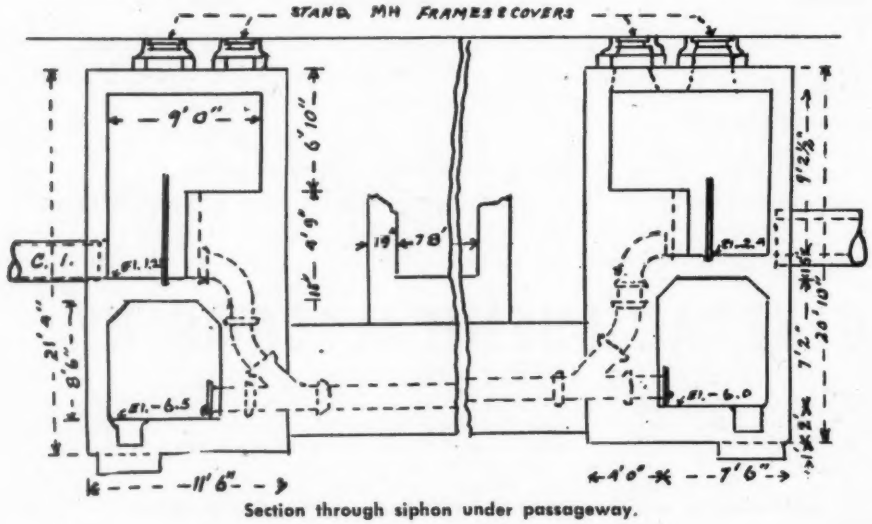
Cast Iron Sewer Siphon Under Tunnel

It was found necessary recently in Chicago to lower a 100 ft. section of a 24" sewer about 8 ft. to permit the construction of a pedestrian tunnel under Washington St. This sag pipe (commonly called an inverted siphon) was made in two units, one 14" and one 16", Class B cast iron pipes and specials being used; there being at each end of each line a 90° and a 45° bend and a Y to connect it to the 24" sewer. At each end of the siphon is a double manhole, one half extending to the bottom of the old 24" sewer, the other half continuing about 8 ft. deeper to the level of the siphon.

Each siphon pipe at each end extends beyond the Y to the manhole, where it is closed by a bolted flange, the removal of which permits rodding or other method of removing an obstruction should one form in the siphon. Each flange has a small opening at the bottom through which the siphon can be drained slowly into a sump in the manhole floor. Meantime sewage will be prevented temporarily from entering either end of the siphon by stop planks dropped into grooves in the manhole walls.

Weir stop blocks in front of the inlets of the two siphon pipes, set at different elevations, direct all the sewage into one pipe until its capacity is reached, when the excess enters the other pipe. The sewer invert from just above the siphon to just below it, about 100 ft., drops 1.15 ft.

The double manholes are 11.5 ft. in diameter and 23 ft. deep, built of poured concrete.



Section through siphon under passageway.

Solving a Filter Washing Difficulty

By O. W. KOCHTITZKY, JR.
Resident Sanitary Engineer, Fontana Dam, N. C.

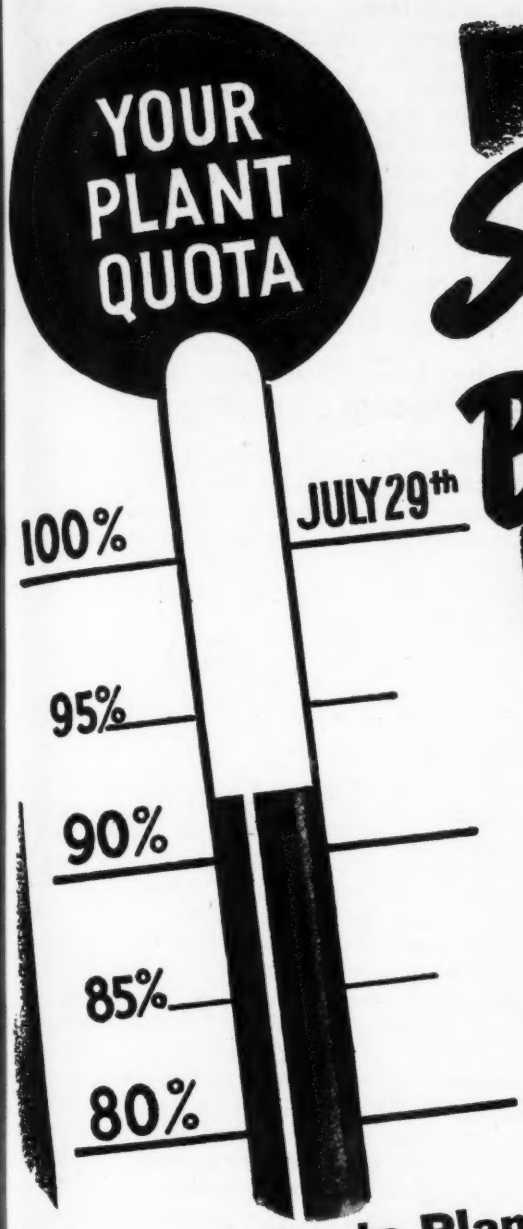
ON page 30 of PUBLIC WORKS for March, 1944, appeared an account of filter washing difficulties. ("A Problem in Filter Washing.") Similar difficulties were experienced recently in a water plant at which I maintain some measure of supervision and it is possible that our experience and solution might be of some interest.

We have a 125-sq. ft. filter, the sand on the surface of which has an effective size of 0.50 mm and a uniformity coefficient of 1.9. A 3,000 gpm washwater pump delivered to this filter only enough water to effect a vertical rise of approximately 22 inches—a rate which did not accomplish adequate cleansing of the sand.

A check of the hydraulics of the filter and piping revealed that the line contained an 8-inch globe valve for permanent setting to throttle the flow of washwater to the desired quantity, and that this throttling reduced the head by slightly over 20 ft.—approximately 50% of the entire loss of head in the system. This globe valve was removed and replaced by a gate valve and spacer, with the result that the flow increased from 1,700 gpm to 2,300 gpm and the vertical rise increased to slightly above 30 inches, and the sand expansion and cleansing were much more satisfactory.

It is realized that a gate valve is not ordinarily used for throttling purposes, but since this valve is set at practically full opening and is sufficiently removed from the filter manifold to eliminate turbulence and poor distribution, its use has resulted in satisfactorily correcting the condition.

Prior to thus increasing the washwater flow, the sewer and



Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: JOHN DOE MFG. CO.—1,000 Employees

1,000 Employees x $100 . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

PUBLIC WORKS Magazine

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

outlet device from the washwater trough appeared to flow full with slight backwater into the trough, and it was doubted whether they would handle the increased flow. However, it was decided that, should the sewer prove to be inadequate, it would be a simple matter to connect an additional sewer to the opposite end of the trough and discharge it into a manhole 20 ft. away. But after increasing the rate of backwash, the existing sewer was found to remove it without difficulty. It appears that this outlet device had previously caused the trapping of some air in the sewer, which was more or less eliminated by the increased flow of water.

Ground Water Service Furnished by North Dakota State Department of Health

A new cooperative project has been set up by the State Department of Health in cooperation with the North Dakota Geological Survey which provides for ground water surveys for municipalities so desiring. Mr. Thad McLaughlin, formerly of the U. S. Geological Survey, is working out of the State Department of Health Division of Sanitary Engineering offices and assisting municipalities requesting such service.

Many North Dakota municipalities have experienced difficulty in obtaining adequate water supplies. Others are finding it difficult to obtain a supply of satisfactory quality for domestic use. It is the intent and purpose of this cooperative project to assist these municipalities, if they so desire, in finding the most suitable and most dependable source of water supply in their respective communities. Mr. McLaughlin is now working at Dickinson where ground water problems have persisted for many years. It appears that the information to be obtained from this survey is exactly the information that the city is interested in obtaining. It will be possible to forecast with reasonable accuracy the length of time that the aquifer from which the city obtains its water supply will continue to supply any given amount of water over a given period of time. Obviously, such a forecast is extremely desirable in order to permit the city to plan in sufficient time in advance for providing an alternate source, or a supplementary source, before it is too late to complete the arrangements.

Other information of value to be obtained from such a survey is the type of well most suited for the specific location. Obviously, the most suitable type of construction in any particular aquifer for a predetermined quantity of water will result in the most economical installation. Proper spacing of wells is also taken into consideration in order to avoid interference between two wells.

Any municipality desiring to make use of the services of Mr. McLaughlin for making a ground water survey in the vicinity should make application to the State Department of Health. The services are offered at no cost to the community. However, it is necessary that a well driller be procured for the necessary test drilling. The amount of test drilling that may be required will vary considerably, depending upon the depth of the aquifer and the number of wells already available that can be used for observation purposes. The city obtaining the services will be expected to provide the major portion of the test drilling expenses.

The length of time that the project will continue is going to depend considerably upon the demand for such services. Therefore, if assistance is desired, application should be made immediately.

In many North Dakota communities only one well is provided to supply the needs of the city. Obviously, another source should be developed as a standby or supplementary source in order to insure dependability. In such instances the ground water survey would be of value to determine the best location for the new well, whether such installation is made immediately or at some time in the future under a post-war construction project.

From the "Official Bulletin" of the North Dakota Water and Sewage Works Conference.

Order That Town Chlorinate Its Water Upheld by Court

A Massachusetts law of January, 1942, provided that the State Dept. of Public Health could, if it thought necessary during the existence of the present state of war, order any water company or department to provide equipment for treating the supply, and that "the supreme judicial or the superior court shall have jurisdiction in equity to enforce any such order." On April 10, 1942, the Department ordered the town of Hudson "to provide treatment equipment for chlorinating all water supplied to the town" at once.

At a town meeting on April 29, the citizens voted not to authorize the Commissioners of Public Works to obey this order. Treatment of the water seemed to them to be unnecessary, since it came from a well-isolated pond in a wooded section and satisfied State and Federal standards for drinking water, and the pond was guarded constantly by an armed guard and two dogs. But the State Dept. of Health feared sabotage; a large number of residents were engaged in producing war goods; and an epidemic in any one community might sweep the whole state; and in October the State brought a bill in equity against "the town, its commissioners of public works and its selectmen," praying that they be ordered forthwith to provide chlorinating equipment. The State Supreme Court in December, 1943, upheld the order. Answering the town's arguments, it stated that the board had a right to specify precisely the kind and amount of equipment to be provided; that the fact that the evil had not yet occurred was no argument, nor that it would cost the town money; and that the board was not required to give the town a hearing, which would have delayed action in the emergency.

Changes in Location of Sewer Construction Lines

Where the purpose of a sewer construction contract, as manifested in its provision and in the contract drawings, was to construct the trenches on the various streets largely in the dirt portion of the road, a provision of the contract conferring power upon the city to order change, limited to an increase or a decrease in the unit quantities and to additions to, or subtractions from, the total work in an amount not in excess of twenty per cent, did not sanction a general and sweeping change in the location of the construction lines which would take the trenches from dirt to macadam. (New York Supreme Court, 36 N. Y. S. 2d, 424).

General language in the "Information for Bidders" that the sewers should be located near the center of the various streets did not justify such a drastic change and

We asked 5 foolish women why they don't check ceiling prices

"The storekeeper might get mad"

You're wrong there, lady. Good merchants appreciate customers who keep an eye on ceiling prices, who don't ask them to buy on the black market, who never ask for rationed goods without points, who share and play square with scarce goods.

..."It's too much trouble"

It isn't a lot of trouble to do the little the Government asks—just remember to ask every time you make a purchase, "Is this the ceiling price?" And it's well worth the trouble—if it holds prices down, lessens the danger of inflation.

"We can afford to pay more"

Maybe *you* can, but how about the millions of soldiers' families who must live on Army allotments? Every time you pay black market prices or buy rationed goods without points, you're helping to send prices up—that's the way inflation comes. And *nobody* can afford inflation.

"My store doesn't display ceiling prices"

All retailers will if you keep asking them, "Is this the ceiling price?" It's the law. Ceiling prices must be displayed wherever goods under ceilings are sold. That's the system which has helped to keep prices so much lower in this war than they were in the last.

"I just don't want to do it"

No—and our boys don't want to fight! But they're doing it—magnificently! It's up to you on the home front to do your part to head off rising prices and inflation, help prevent producing a depression for our boys to come home to. Don't be a SABOTEUR on the home front!

Check and be proud! You should be proud if you're the kind of loyal, patriotic American citizen who never pays more than ceiling prices, who pays her ration points in full, who shares and plays square with scarce goods!

It is because of you and millions of women like you—cooperating with American merchants—that the cost of living has gone up only 7 per cent since your Government's price control started.

But the end is not yet. So keep up the good work. Ask *every time*—"Is this the ceiling price?" Never buy a single thing that you can do without. Save your money—in the bank, in life insurance, in War Bonds. When you use things up, wear 'em out, make 'em do, or do without . . . you're helping to HOLD DOWN PRICES!

YOUR STORE WILL BE GLAD TO HAVE YOU ASK:

"Is this the ceiling price?"

A United States War Message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Twenty-two

Reasons Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

- **Reduces the Number of Expansion Joints**
- **More Dummy Joints Divide Contraction Openings**
- **Prevents Cracking**
- **Retards Creeping**
- **Controls Warping**
- **Reduces Curling**
- **Relieves Stress**
- **Lessens Bumps**
- **Minimizes Pumping**
- **Minimizes Panning**
- **Lessens Deterioration**
- **Lowest Cost**
- **Limits Maintenance Cost**
- **Anchored in Place — Is Permanent**
- **No Extrusion**
- **Localizes Expansion and Contraction**
- **Assists in Normalizing the Slabs**
- **Ribbon Joint is Continuous in Length**
- **Prevents Infiltration of Water**
- **Increases Strength of Slabs**
- **Produces Homogenous Structure**
- **Provides Expansion Relief for the Hot Upper Part of the Slab**

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

• Ask for Equipment Specifications •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U. S. A.

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could not override the specific details of the contract drawings on which the bids were invited. The absence of an item for excavation in macadam in the contract was held to point persuasively to the controlling nature of the contract drawings. The court in its opinion recognized the difficulty of defining the limits of a municipality's power to make changes in the work with any precision under such contract provisions.

The contract provided for written notice by the contractor of claims for damages. Under the rule followed in the New York cases that provisions in building contracts calling for a written order or for a written notice of claims and damages may be waived by the subsequent conduct of the parties to the contract, it was held that the town's engineer waived the requirement of a written statement of the nature of the damage when he led the contractor, by repeated assurances during the progress of the construction, to perform work which the contractor maintained in good faith was not demanded by the contract.

The contractor's damages were measured by the difference between the reasonable value of the work as performed and that of the work as contemplated by the contract and by the drawings and specifications.

The contractor, however, failed to satisfy the court on one of its claims (the use of a backhoe for excavating instead of a trenching machine) by proving by a fair preponderance of the evidence that it was required to use the backhoe because the sewer lines were changed from dirt to macadam.

The contractor was allowed to recover for replacement of macadam not contemplated by the contract. He was not bound by the unit price which he bid for this work under the contract, that price not being controlling where there has been such a large deviation from the original plans in the location of the lines as to constitute a breach of contract by the municipality. When the town stepped beyond the limits of the contract it lost its right to invoke its power under the contract to alter the unit quantities of the work.

The town's counterclaim for liquidated damages for delay by the contractor was disallowed, the delay being held due largely to its own unlawful orders, and whatever delay there was being acquiesced in by the town.

Contract to Sell Water Pipe Line When Completed

In an action contesting the validity of an order of court creating a water pipe line improvement district and certain contracts entered into by the district, it was unsuccessfully contended that although the improvement district could build the pipe line and then sell it to a city, it could not enter into a contract to sell it before it was built. The Arkansas Supreme Court (Page 2. Highway No. 10 Water Pipe Line Improvement District, No. 1, 145 S. W. 2d 344) said that if the district could employ someone to build the pipe line and then sell it, it could certainly enter into a contract to sell when completed, and convey to the purchaser.

When the commissioners of the district contracted to convey the pipe line to the water department of a city immediately upon completion, they undertook to do nothing except what they were authorized by statute to do, and the manner in which their duty was performed was held largely a matter within their discretion. Although these boards have only the powers expressly granted, they must act under many different

circumstances, and their actions must be adjusted to meet the exigencies of each particular case, and the sound discretion of the members of the board exercised, where this discretion is not controlled or denied by the Legislature, and the discretion to be exercised is that of the officer, who is familiar with the situation and performs the duty imposed upon him, and not that of the court which reviews his action. (Cherry v. Bowman, 106 Ark. 39.)

Dresser Joints for Large Pipes

In the April "Waterworks Digest" we gave an abstract of an article "Outline of Design Factors for Steel Water Pipe Lines" which appeared in the January issue of the Journal of the American Water Works Association. In this the statement was made: "Field joints are usually Dresser type couplings or welding, the former for joints on pipe 24" and smaller." The Dresser Manufacturing Co. informs us that "most of the large diameter steel water lines going in today, outside of the Pacific Coast and New York, are coupled. In fact, connecting this large pipe with Dressers is considered standard in many localities."

Recovery for Piling Claimed to Be Defective

Action was brought for damages based on breach of warranty allegedly contained in a written contract for the lease and sale of steel sheet piling, necessary in the construction of the Buffalo Sewer Treatment Plant project. There was no dispute as to types or quantity ordered and delivered. Plaintiff in substance complained that the defendant represented that the piling was suitable and fit for the particular use of plaintiff on its contract; that the piling furnished was not in good repair or in drivable condition and was otherwise bad; and that plaintiff had to purchase additional piling resulting in damage to the extent of $19,094.23.

Plaintiff pleaded the contract, paragraph "Tenth" of which read: "The Lessee represents to the Lessor that the Materials are suitable for the purpose for which the Lessee intends to use them as stated herein, and undertakes full responsibility for the representation, realizing that the Lessor relies thereon and intending that it should so rely." The lessee is the plaintiff in this action, and the lessor is the defendant.

Paragraph "Fourth" of the contract read: "Any Materials which prove to be defective shall be replaced by the Lessor, at the Lessor's expense, f.o.b., the delivery point specified in Article Third hereof, but the Lessor shall have no other liability, on account of shortages, defective Materials, or the use or handling of the Materials."

This action, the New York Supreme Court, Albany County, pointed out (Hockensmith Contracting Co. Inc., v. Carnegie-Illinois Steel Corporation, 22 N. Y. S. 2d 280) is not an action to reform the contract by reason of mutual mistake or otherwise. The contract was not ambiguous as made, and therefore fell within the rule that contracts must be enforced as they are written.

The court held the complaint did not state facts sufficient to constitute an action. The plaintiff represented that the materials were suitable for the purpose for which it ordered them from defendant. Any possible claim plaintiff might have against defendant for damages was definitely covered and expressed by paragraph Fourth of the contract. Defendant's motion to dismiss the complaint was therefore sustained.

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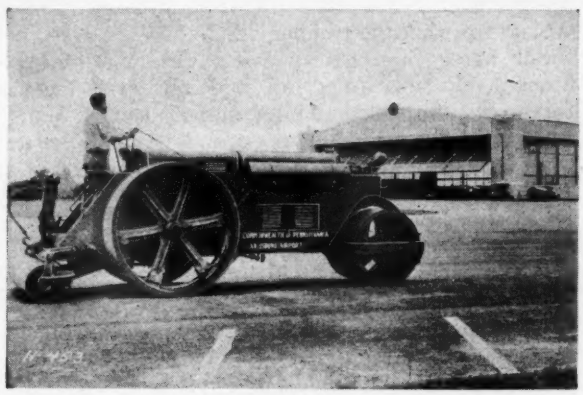

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Things Found in a Plugged Sewer, and How

Describes a kink for dislodging the matter in a plugged trap, and what may happen when using it.

By A CITY ENGINEER

THE General Electric Company is a friend to man —and woman. This company has put on the market a small household machine whose purpose is to grind up garbage and kitchen trash so that these residential wastes may be readily disposed of in the house sewer system in a safe and sanitary manner. We sewerage operatives know from sad experience that people will attempt to dispose of staggering amounts of extraneous material via the sewer route, and we live in hopes that some day most people will serve us with comminuted matter instead of shoving things down their toilets by main force. Here is a case in point.

There is one middle-aged matron in our city who goes about with a chip continually on her shoulder. Nothing ever pleases her, and she is never happy unless she is quite miserable about something. I detected a gleeful note in her complaint one Sunday morning when she informed me by telephone that her sewer was stopped up and running over on the bathroom floor. She demanded that I send someone around immediately. I advised her to get a plumber, but I knew she told the truth when she said she had been unable to get one who would come. I didn't blame them in the least. I called the City Plumber, but he was off fishing (or something), so I dragged myself over to see what the trouble was.

She surely had grief. Every time the toilet was flushed the bowl filled up and ran over the floor. I removed the cleanout plug under the floor, but the trouble was beyond that. So next I took off the sewer trap riser cap in the front lawn and poked a stick down to the trap. It was plugged solidly. The next step was a kink I have developed through long practice and dire necessity. I rummaged around in the lady's basement until I found a board about four feet long, a block of wood, a sack and a length of garden hose. The sack was wrapped around one end of the board, and in conjunction with the block a teeter or seesaw resulted, whereby if I stepped forward on the board the sack was pressed firmly on the end of the riser pipe in the lawn, and if I rocked back this stopper was lifted from the end of the pipe. Finally I ran water into the end of the cleanout fitting with the garden hose while I stood firmly on my improvised quick-operating valve. The idea is to get sufficient hydraulic head to move the stoppage along to the large sewer main in the street. If this action does not occur readily, a very effective "water hammer" action can be secured by jumping on the board valve.

All this time my friend (the hussy!) was making sarcastic remarks about our fair city, its employees, plumbers, and me. She was standing quite close when I noticed water oozing out under my board and sack. That was the cue I had been waiting for and I reared back on my board, raising it quite high off the pipe. I had a good head of water backed up into the house plumbing, and the resulting four-inch geyser thoroughly wetted my companion, while I was protected by the board. And I am afraid I let it run longer than necessary before I slammed the opening shut. The jar of the sudden stopping of the water flow did succeed in pushing out the entire remaining stoppage, as attested by the gurgling and sucking of air at my feet. So my strategy was successful once more and my job was done—or nearly so. My audience had been taken so unawares that she had stood as if rooted to the spot. She was still standing there, drenched from the waist down, as I looked up smiling. I am afraid that smile was out of place, under the circumstances. Her fists were clenching and a tempest was brewing on her sour map, when she happened to look down at the ground. That saved me. Piled up at her feet, and strewn careless-like over a wide area of well-kept lawn were the contents of the plugged sewer line. Several days' accumulation of things the family did not wish to keep were here again displayed in full view. Some people use toilet paper daintily. She didn't—there were festoons of it four feet long draped around her ankles. Newspaper, paper towels and kleenex opened their folds and revealed their contents. In another category were kitchen scraps—vegetable skins, orange peels, apple cores, lettuce leaves, cabbage and cauliflower trimmings, beet and carrot tops and rotten bananas. Half a torn dish towel, a pair of silk panties discarded for an obvious reason, a sock, several pieces of a child's toy balloon, grocery tags, labels from cans, matches and cigar butts, besides the customary assortment of plastic objects, pressed into wierd shapes, and of various colors ranging from the green-black resulting from certain concentrated vitamin intake to the pale yellow popularly associated with infants.

I walked off and left the chastened lady choking in the stench. I found a rake and shovel and proceeded to clean up the premises. When I had buried the spoils and hosed off the lawn the place looked even better than before. The lady had disappeared—I presume she had some cleaning up of her very own to do.

Written Orders for Extra Work on Sewer

In an action for extra work and materials furnished by the plaintiff contractor in the construction of an interceptor sewer system for the defendant city, the evidence disclosed that soon after the contractor began work, it developed that certain changes in the plans would be necessary in order to make the sewer system work properly. The extras claimed consisted of cost of materials and labor in constructing extra manholes not shown on the detailed plans, cost of constructing a different type of manhole than those specified, caused by conditions discovered as the work progressed, changes in the size and kind of pipe, relocation of the sewer, and other changes and delays caused by conditions after the work commenced, all done at the direction of the engineer in charge of the work.

After the contractor had made three changes at the re-direction of the city engineer in charge, he requested a meeting with the Board of Works, and there one of the members of the board stated that whenever the engineer in charge of construction should determine upon changes to be made in the original plan and specification, causing additional work and extra material, the contractor should write a letter to an attorney employed by the city to conduct the legal phases of the project, notifying him of the proposed change, and if the contractor received no objections from the Board of Works, he should proceed under

the direction of the engineer in charge, and the city should pay for, any extras caused by said changes.

This procedure was followed by the contractor for twenty-five changes made by the engineer which required extra labor and material. Each time the contractor wrote a letter to the attorney designated. No objections were received from the Board of Works and the changed specifications were carried out. The sewer was accepted when completed and the contract price paid.

The city's principal objection in this action was a provision in the contract, "but the contractor shall not proceed with such alterations without a written order from the board." It was insisted that the city could not waive this provision, so that recovery by the contractor was barred.

This contention was not sustained by the court, which held that "after said contract had been fully executed, no objections having been made as to the character of the work or materials furnished, the city became bound to pay for the same."

The state statute requiring a contract for a public improvement exceeding a specified cost to be let to the lowest and best bidder did not, it was held, prevent the city from entering into a valid oral agreement to pay for the extras involved in the case. Judgment for the plaintiff was affirmed. Michigan City v. Witter, Indiana Supreme Court, 34 N. E. 2d, 132.

A Novel Highway Bridge In Bolivia

Spanning the 820-foot Espiritu Santo river at a point approximately 117 miles northeast of upland Cochabamba, second city in Bolivia, a novel bridge supplies a link in a new main highway running to Todos Santos, at the head of navigation on the Chapara river.

Construction of the 139-mile road over some of the most difficult terrain in the world provided Bolivian engineers and their North American colleagues who aided in the work with many problems, and not the least of them was how to span the Espiritu Santo quickly and with a minimum of hard-to-get steel. Their answer was a cable bridge capable of carrying almost 7 tons of freight, passengers or vehicles across the stream in less than 90 seconds, and built for less than 15 per cent of the

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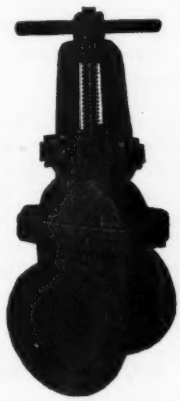

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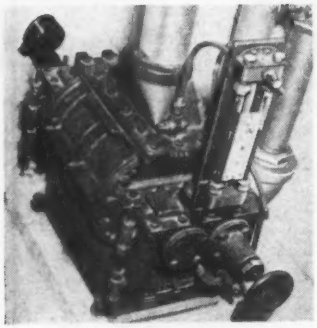

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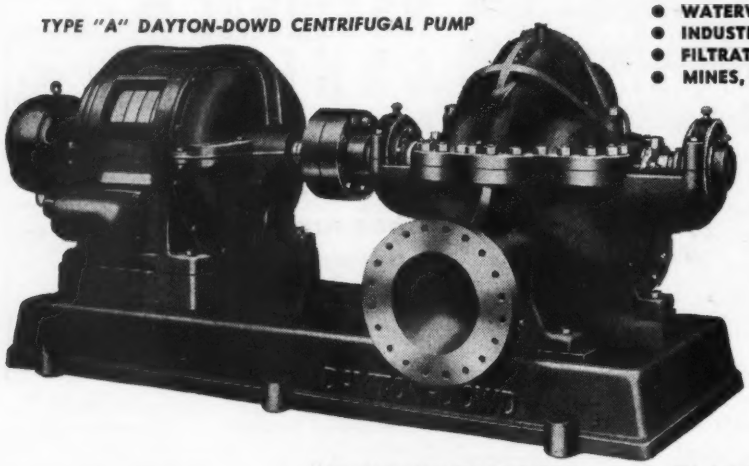

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cost of conventional structures of the same length.

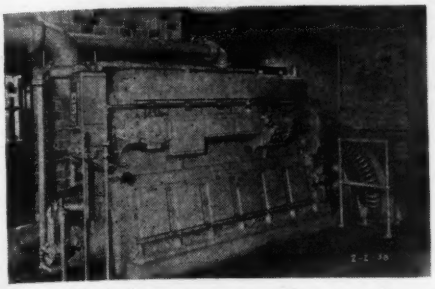
The bridge has a main span of 885 feet between two structural steel towers 110 feet high, each set far enough back from its respective bank to be immune to floods and high water. Supported within the towers and extending 1,185 feet from anchorage to anchorage are two special cables designed by a United States bridge-building firm. These track cables, in turn, are suspended from an overhead system of supporting cables passing over the tops of the towers to their anchorages on each side.

On the track cables runs a 4-wheel carriage, resembling an overhead traveling crane, from which is suspended a large structural steel cage. Ramps on each side of the river enable trucks to enter the cage under their own power, to be whisked across the river by a flexible steel hauling rope operated by a 20-horsepower gasoline engine on one side. Special controls enable the operator of the cage to control its movement at all times and bring the car into either terminal by hand, should the gasoline engine fail.

At first sight the bridge seems to resemble conventional tramways in use in many parts of the world where economy or topography make ordinary bridges impractical. The feature which differentiates the Espiritu Santo bridge from conventional tramways is the special suspension of track cables to permit almost level travel at all points from tower to tower. The usual tramway, unless equipped with costly and complicated drive-units and speed regulators, drops the cage into the sag in the cables with all the complications and discomfort of a roller-coaster.

Moreover, because of sharp changes in the angle of track cables on a conventional tramway, the cage must be hung from a trunnion on the cab to allow for longitudinal rotation, a defect which is eliminated in the construction of the bridge here. And where a 60-horsepower engine is needed on tramways because of the steep grades travelled by the car, a 20-horsepower engine supplies all the power needed on the level Espiritu Santo crossing.

The novel bridge has been in operation for several months now, and has attracted the attention of highway engineers everywhere in South America. Its low initial cost and the speed with which it can be erected and put into service bid fair to make the Espiritu cable bridge a model for many similar structures in other American Republics.



Six-cylinder sewage gas engine generating electricity at Ft. Dodge, Ia.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

The Gary Plant's Three Years

The Gary, Ind., activated sludge plant started operating in the fall of 1940, treating the sewage of 100,000 population. Reduction in suspended solids averaged 96.12% in 1941, 97.22% in 1942 and 96.58% in 1943; reduction in B.O.D. averaged 94.31%, 94.72% and 93.50%. These are yearly averages. During 31 days in 1943 there was primary treatment only, due to clogged diffuser tubes, which lowered the average for that year. Gas production averaged 146,156 cu. ft. per day in 1941, 157,790 cu. ft. in 1942 and 143,660 in 1943. The cost of operation for the three years respectively was $9.42, $8.79 and $8.70 per million gallons; 64.82 cts., 66.52 cts. and 68.27 cts. per capita. No bulking has occurred, and no foaming of digesters, even when started without using seeded sludge. Supernatant from the digesters is mixed with raw sewage without upsetting the treatment process, adding about 1 ppm B.O.D. and 5 ppm suspended solids.

In wet periods about half the flow is ground water infiltration, which brings in fine sand, as much as 12.57 c.f. per mg being removed in the grit chambers, the average being 8.75 c.f. The only trade wastes are spent pickling liquor and occasionally cutting and fuel oil. In 1943 the sewage received 672,000 gal. of pickling liquor, and the average iron content of the sewage was 10.62 ppm. The pickling liquor causes clogging of diffusers in the aerators, probably aids sedimentation.

Gas production in 1943 averaged 1.44 c.f. per cap. per day. Occasional oil discharges decrease this as much as 50%. If the gas used for power had been purchased it would have cost $64,360 or an average of $58.77 a day. The air blown into the sewage has averaged 0.45 c.f. per gal. Sludge returned has averaged 35 to 40%.[G12*]

Heating Sludge Digesters

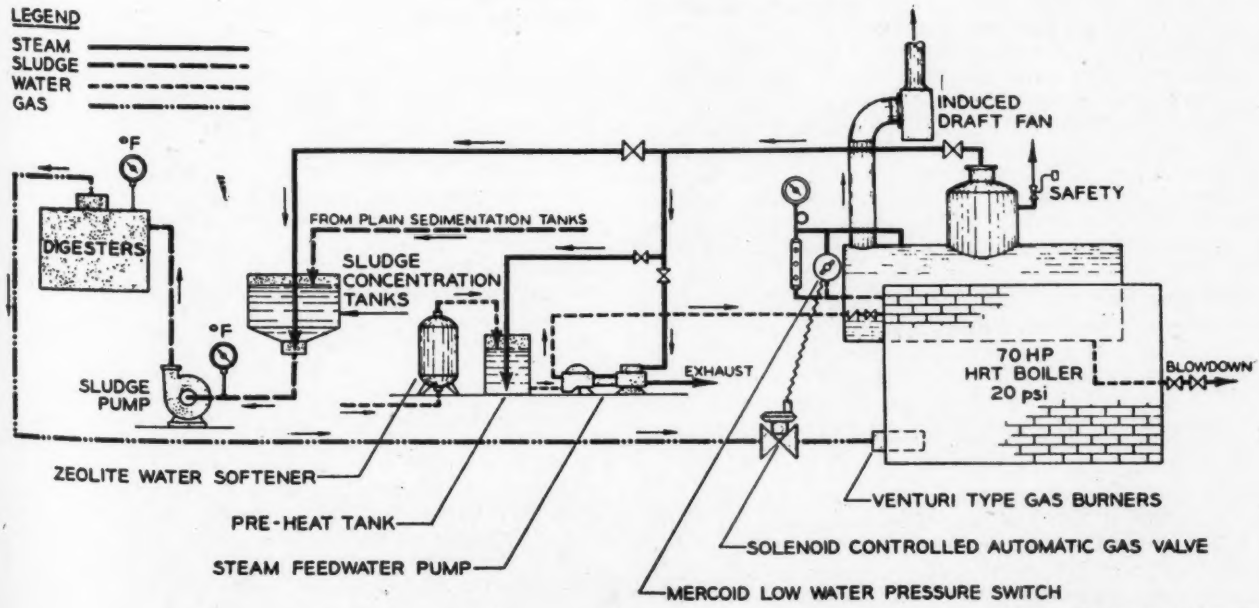
Effective digester heating yields a greater total quantity of gas produced at higher rates, places the digestion process under uniform control, and decreases the required detention time, thus increasing the tank capacity.

Exterior pipe incrustation of heating coils is due to too high coil temperatures, and reduces heat transfer to the sludge. It generally occurs if the temperature of the circulated water exceeds 130° F. Interior pipe scaling may occur if considerable hard water make-up is used. Incrustation is removed more readily from vertical coils, which can be removed in sections.

Coils should be placed at least 3 ft. from the tank walls and in the actively digesting sludge, which in most digesters extends from 3 or 4 ft. above the bottom to slightly above mid-depth. Heating scum to reduce the amount formed can be accomplished by mixing with it heated sludge from below.

To prevent corrosion of the tubes and burners of hot water heaters due to condensation, some recommend minimum water temperatures of 180° in the heater and 130° in the return, but this is apt to produce coil incrustation. The boiler can be maintained at 180° and deliver water to the coils at 130° by means of a thermo-

*See Bibliography in the June issue.



Courtesy Sewage Works Journal

Diagrammatic drawing of sludge steam heating system and controls, Los Angeles County.

statically controlled by-pass around the heater. Corrosion of heating and mixing equipment in the tank can be prevented by cathodic protection. It was used successfully at the Los Angeles Terminal Island plant at a capital cost of $200.

Breakage of coils is sometimes due to scum loads or to vibration set up by gas ebullition; better support and heavier pipe should prevent this, or use of vertical coils.

Heating with steam instead of hot water at the Los Angeles County Sanitation District's joint disposal plant eliminated some of these difficulties, saved much critical material and decreased costs. (See illustration). The sludge is preheated by steam injection as it is being pumped from concentration tanks to digesters and no further heating is necessary. The amount of water (steam condensate) added to the sludge is slightly less than 1% for each 10° temperature rise given the sludge. The steam pressure required for injection into open preheat tanks or digesters is friction in the transmission line plus 1 lb. for each 2.3 ft. of depth below the surface to the injector—seldom more than 15 lb. The boiler therefore should be in the heating class, the controls and accessories for which are less costly than for pressures over 15 lb.

Steam injection directly into the digesters might be equally satisfactory for some plants, and with this, it would be easier to compensate for tank heat losses, smaller heating units could be used, and convection current mixing could be established by steam injection at low levels.[C61]

A Sewage Plant Rose Garden

Hickory, N. C., in 1941 built at its sewage treatment plant a rose garden 200 ft. in diameter with a lily pool in the center and containing 4637 rose bushes; the site having previously contained two large gulleys partially filled with junk and refuse. The local Rose Club supervised the work, obtaining $2500 in private subscriptions to buy the bushes, while the city furnished the labor. Over 2,000 people have visited the plant in one day. The flowers are sent to the local hospitals. Sludge is used as the only fertilizer. Underground water pipes permit reaching any part of the garden with 75 ft. of hose.[X5]*

Wartime Operating Problems

One army post had large photographic laboratories which discharged into the sewer large quantities of wastes containing silver, hyposulphites, etc. Even when 4 cu. ft. of air per gallon of sewage was blown into it, no oxygen was left for oxidizing the organic matter. At another plant, wastes from a TNT plant interfered with the operation of a trickling filter; were then turned into a lake and killed the fish in it; finally use of activated carbon solved the problem.

Limited sludge bed capacity has been offset by the addition of alum to the sludge as it is drawn to the beds, which "does a remarkable job of drying."

Indiana's State Board of Health finds "complicated priority regulations are just so much scrap paper so far as the small sewage treatment plant operator is concerned." Also that women are good substitutes for men as chemists, bookkeepers and secretaries; and that giving proper care to machines, pumps, etc., will extend their useful life several years.[C53]*

Charges for Treating Industrial Wastes

Increased operating costs at the New Brunswick, N. J., sewage treatment plant due to industrial wastes has led the city to inaugurate special charges for treating such wastes. Each industry must pay a charge based on rates of $22 per mg of flow, $5 per ton of solids in the wastes, and $5 per 100 lb. of chlorine demand exerted by the wastes. This is expected to provide about $45,000 annually—about half the cost of operating the plant. Industries must minimize peak concentrations and must produce wastes of acceptable quality (by constructing equalizing tanks, by partial pretreatment or otherwise).[E8]*

*See Bibliography in the June issue.

Temperature in Trickling Filters

In filter beds at Leeds, England, filled with 2″-4″ gravel 4 ft. deep, it was found that "the temperature within the bed is directly related to the bulk rate treated; i.e., to the quantity of food supplied to the fauna. This quantity determines their number and activity, and the heat they produce to maintain the bed temperature. . . . There is evidence that as the temperature of the bed rises a point is reached when the macro-fauna are so numerous that there is a food shortage and the thickness of the bacterial film is reduced until purification decreases. In other words, there is an optimum temperature, governed by the character of the influent and dosage, at which the best purification is obtained." [D14]

Grit Chamber and Measuring Flume

A combination grit chamber and measuring flume for flows of from 250 to 1,000 gpm, and providing a constant velocity of one fps in the grit chamber, has recently been installed at the Santa Maria, Calif., sewage treatment plant. It consists of a channel of parabolic cross section 45 ft. long, with a Parshall flume 6″ wide at the downstream end to measure the flow and so regulate its depth as to maintain the velocity at one fps. A grit slot 12″ wide and 7″ to 12″ deep is provided in the bottom of the channel. Checks by submerged floats indicate that the time required to traverse 40 ft. of channel ranges from 37½ to 40½ sec. Grit collection has been very satisfactory. Cost of construction, $1948.[E10]

Sewer Siphon Pulled Into Place

Bridgeport, Conn., recently placed a double sewer siphon, two 24″ c.i. pipe, across a tidal stream by connecting the pipe up on shore and pulling them across in a trench previously excavated. The pipe lines were 240 ft. long, with flexible joints between 36 ft. sections of b&s pipe. While being drawn across, the front ends of the pipe lines were supported by a timber toboggan and plugged, and three pairs of 50 gal. drums provided additional buoyancy. The trench, 8 ft. wide and 16 ft. maximum depth, was dug with a drag bucket. After the pipe was in place it was found to be about a foot high at one point, and a diver removed material from under it by using compressed air and water. The completed lines met the requirement that leakage under 40 lb. pressure should not exceed 94 gal. per joint per 24 hours.[E11]

Insulating a Digestion Tank

At the Preston, Idaho, plant are two 25 ft. dameter digestion tanks which are insulated against heat loss by an 8″ wall of pumice concrete, mixed 1 cement to 10 or 12 parts of pumice stone by volume, around the outside of the gravel concrete walls and over the top of the primary tank. The winter temperature here normally goes 20° below zero and may reach 30°. The pumice was obtained from a nearby volcanic vent.[J10]

Adjusting the Jonesboro Treatment Plant

Jonesboro, Kans., in 1941 built a 1 mgd treatment plant comprising two 35-ft. primary clarifiers, two 124 ft. trickling filters, a 45 ft. final clarifier, two 35 ft. digesters, and sludge drying beds. Piping permitted operating the filter conventionally or recirculating effluent from either filter or final clarifier. All the sewage is lifted 20 ft. to the plant.

The plant gave satisfactory results from the start, but they were improved by operating changes from time to time. When sludge was pumped from the primary clarifiers at 4-hr. intervals, settled sludge in the clarifiers gasified and floated to the surface; so the time clocks which controlled the pumps were adjusted for half-hour cycles of 1 min. 40 sec. each, which eliminated this trouble, raised

the temperature in the digester and lessened the supernatant.

The manually operated stirring device in the digester was changed to automatic operation by clock control, stirring for 5 min. at 15 min. intervals, and better settling was obtained; which was further improved by keeping the level of the solids in the primary digester below the wash stream of the impeller, and by daily transfer of sufficient bottom primary sludge to the secondary to keep clear the transfer of supernatant. Sludge was kept in the secondary digester until the supernatant became turbid, then was drawn onto the drying beds.

The filters at first developed a sour condition, found to be due to the clogging by construction material of the air vents from the filter block underdrain. Recirculation was changed from filter effluent to the sludge well of the final clarifier, giving a much clearer final effluent and reduction of B.O.D. For the first few months the overall reduction of B.O.D. averaged 92%, but rose to 96% with the changes in operation.[G15]

Controlled Digestion

There has been installed in the United States over 70 million cu. ft. of separate sludge digestion capacity, serving approximately 30 million population. At present, almost 40,000 bhp is being generated from gases from digestion tanks. But there is still much improvement possible in construction and operation of digestion plants. "Controlled digestion" embodies a system of tanks, piping, circulating and transfer pumps, supernatant withdrawal and supernatant treatment means and procedures for speeding up and controlling the digestion process.

Supernatant liquor contains more active organisms than digested sludge and should be circulated to the top of the tank to seed the floating matter there. An increase of volatile acids in the digester indicates approach of poor digestion. It is found that addition of ammonia nitrogen aids digestion. Controlled digestion, utilizing these ideas can: 1—Reduce digester capacity allowances materially in the original design. 2—Increase the effectiveness of existing digester capacity by greater reduction of solids and more uniform rate of gas production. 3—Allow greater use of all tanks of a stage digestion system. 4—Provide means of overcoming difficulties normally encountered in starting digestion action in a newly installed system. 1 and 2 are effected by increasing rate of digestion through supernatant recirculation; bringing of layover scum solids into digestion by use of ammonia nitrogen control and consequent release of additional space for active digestion; using volatile acids control to permit handling higher loadings by anticipating any retarding conditions and providing a means for rapidly overcoming same; removing the supernatant from the most desirable elevation of the tank contents, and treating it before returning it to the treatment process, thus reducing the need for quiescence in a second-stage tank, which can then be used for volatile acids control.[C59]

Designing Grease Interceptors

Grease interceptors (also called grease traps) have been used to prevent clogging of pipes with grease, to prevent large quantities of grease from reaching the sewage disposal works, or to facilitate the reclaiming of grease for sale. Reclamation as near its source as possible is the ideal solution, but is hardly practicable for residences, where the small amounts of grease from kitchen sinks are so mixed with soaps, washing compounds and food wastes. But in restaurants and commercial-type kitchens large quantities of pure grease and fats are discharged, and interceptors should be installed; preferably all water containing grease and fats, and only such water, should be discharged into a separator.

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In an interceptor the grease separates by flotation, the specific gravity being generally about 0.91, and theoretically the interceptor will do a good job if the mean velocity through it is 0.05 of its length divided by its depth, which in most commercial interceptors is 0.1 fps; but practically the velocity should be not over half of that to allow for short-circuiting and turbulence. One of the most important design features is provision for easy cleaning and removal of accumulated grease. The discharge pipe from the interceptor should always be vented to prevent the siphoning off of the contents. The rate of flow to be provided for by the interceptor should be at least 5 gpm from a small residence or apartment sink, 10 gpm from a large residence sink or dish washer, 15 gpm for a restaurant, up to 40 gpm for a 50 to 100 gal. dishwasher in a restaurant. The grease-retaining capacity should be at least twice the rate-of-flow rating, and when this is reached, the efficiency should not drop below 90%.[C55]

Sale of Sewage Grease by New York

During the last seven months of 1943 three of the New York City plants collected 650,000 lb. of sewage scum and sold it to a fat vendor at 0.8 ct. per lb. This scum averaged about 53% water, 37% ether-soluble fat and 10% impurities. Five plants now collect grease, the Wards Island, Bowery Bay, Tallmans Island and Jamaica plants being activated sludge and the Coney Island plain sedimentation, the first three having preliminary sedimentation tanks. All have mechanical skimmers, and the scum is delivered to grease-separation manholes, from which it is removed by hand by wire mesh dippers. The amount of grease recovered averages only about 1 or 2% of that found in the sewage by analyses using chloroform.[C58]

Economy of Lag Tanks in Sewerage

In designing a sewerage system for a munitions project covering 16,000 acres with many widely separated production centers, several at least a mile apart, where sewage treatment was necessary, a single treatment plant was decided upon, although the topography required either very deep sewers or about a dozen small pumping stations. ("Flush-kleen" pumps were used where the peak flow was less than 600 gpm.) Most of the sewage goes to a main station, where there are three 500 gpm vertical non-clog pumps.

There are about 250 showers, all of which were to be used at change of shifts, no industrial water and very little domestic flow. For this reason two "lag tanks" are provided, into which the small pumps discharge the sewage at a high rate, and from which it flows at a slow uniform rate throughout the 24 hrs. This permits using 13,300 ft. of 10" pressure mains and 6,800 ft. of 12" main instead of 9,000 ft. of 16" and 11,100 ft. of 18", which would be required if there were no storage; and the main pumps have a capacity of 520 gpm against a 20.4 ft. head instead of 2200 gpm at 38.3 ft. head. One lag tank has a capacity of 50,400 gal. Construction cost saving, $30,000.[H26]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

C *Sewage Works Journal*
May

54. Sewage Works Check List for Postwar Planning. Pp. 479-481.
55. Design and Operation of Grease Interceptors. By F. M. Dawson and A. A. Kalinske. Pp. 482-488.

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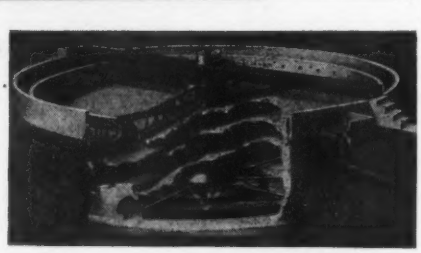

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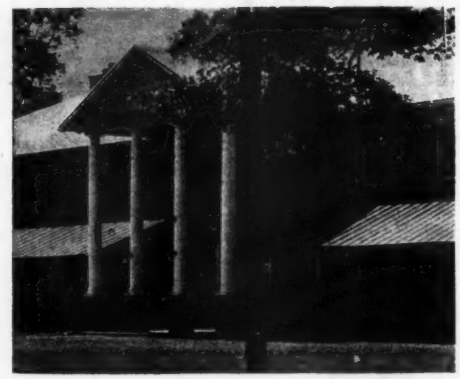

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56. Exclusion of Waste Oil From the Baltimore Sewage. By C. E. Keefer. Pp. 489-490.
57. Grease Removal Ordinances and Grease Problems in Sewer Maintenance. By Morris M. Cohn. Pp. 491-495.
58. Utilization of Sewage Grease. By Wellington Donaldson. Pp. 495-503.
59. Controlled Digestion. By Harry E. Schlenz. Pp. 504-526.
60. A Water Superintendent's Interest in Sewage Treatment. By Richard E. Bonyun. Pp. 527-533.
61. Digester Heating and Mixing Equipment. By Vinton W. Bacon. Pp. 534-539.
62. Oxidation-Reduction Potential Measurements in Activated Sludge and Activated Sludge-Sewage Mixtures. By Gerard A. Rohlich. Pp. 540-557.
63. Modifications of the Relative Stability Test for Sewage. By Samuel H. Hopper and Otto W. Briscoe. Pp. 558-570.
64. Volume Characteristics and Disposal of Laundry Wastes. By Harry W. Gehm. Pp. 571-601.
65. Sewerage Developments and Prospects in Canada. By A. E. Berry. Pp. 602-612.
66. Sludge Concentration and Barging at the Elizabeth, N. J. Sewage Plant. By Willem Rudolfs. Pp. 617-622.
67. Servicing Sludge Gas Burning Equipment. By Walter M. Kunsch. Pp. 626-629.
68. Operation and Maintenance of Sewage Pumps. By Glenn Searls. Pp. 629-632.
69. Extracts From Operation Reports. By George J. Schroepfer, and W. W. Mathews. Pp. 632-639.

D *The Surveyor*
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13. *p.* Some Aspects of River Pollution. By H. Clay. Pp. 185-186.

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14. *p.* Notes on Means of Increasing the Work Done by Percolating Beds. By John T. Thompson. Pp. 225-228.

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15. Sewage Sludge Utilization in Agriculture. Pp. 235-236.
16. *p.* An Experimental Two-Stage Biofiltration Plant. By C. Rose. Pp. 239-240.

E *Engineering News-Record*
May 18

10. Dual Grit Chamber and Measuring Flume. By York Peterson. Pp. 102-103.

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11. Double Sewer Siphon Pulled into Place. Pp. 92-93.

G *Water Works and Sewerage*
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14. Water Works and Sewerage Under One Management. By John W. Pray. Pp. 153-156.
15. The Sewage Treatment Plant at Jonesboro, Arkansas. By Chester A. Smith and Lloyd M. Rebsamen. Pp. 157-162.
16. *p.* A Water Superintendent's Interest in Sewage Treatment. By Richard E. Bonyun. Pp. 178-179.
17. Corrosion of Digester Heating Coils. By Richard Pomeroy. P. 185.
18. Sewers. By Carroll H. Coberly. Pp. 186-188.

H *Sewage Works Engineering*
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25. Gas Hazards Experiences in Ohio. Pp. 280-282.
26. Sewage Pumps and Lag Tanks Speed Ordnance Plant Work. By Herbert L. Kaufman. Pp. 285-287.
27. Cannery Waste Treatment Reduces Stream Pollution. By Robert W. Heider. Pp. 287-288.
28. Foaming and Sludge Removal in Floating Cover Digesters. Pp. 289, 310.
29. Studies of Methods of Reducing Plant Operating Costs. P. 291.
30. Maintenance of Aeration Equipment in Time of War. Pp. 295-297.

J *American City*
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10. A Small Primary Sewage Treatment Plant. (Preston, Ida.) By Robert G. Harding. Pp. 81-84.

P *Public Works*
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27. Sanitary Engineering Services in the First Service Command. By Robert N. Clark. Pp. 20-22, 74.
28. Conservation and Salvage of Edible Grease in the Fifth Service Command. By Alden E. Stilson. Pp. 24-26.
29. Concordia, Kan., Uses Prisoner-of-War Labor. By E. W. Powell. P. 26.
30. Water and Sewage Chemistry and Chemicals. Pp. 32-68.

The War Emergency

(Continued from page 7)

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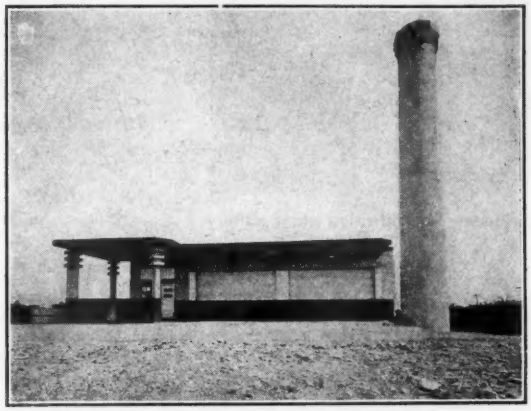

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The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Water Consumption In Leeds, England

A survey was made recently of water consumption in several districts of the city of Leeds. One district contained 712 small semi-detached houses each with bath, sink, washbasin and toilet, and a few larger houses with additional wash basins and toilets, with a total population of 2143. Here the consumption averaged 26 gal. (31 U. S. gal.) per capita.

Another district contained 288 corporation houses occupied by "rehoused slum dwellers," and here the consumption averaged 22.5 gal. (27 U. S. gal.) per capita. In a block of flats containing 786 families, 2439 persons, the consumption averaged 18.5 gal. (22.2 U.S. gal.) but this did not include the water used in communal laundries and restaurants. The rehoused slum dwellers had not yet become "water conscious," having been used to only one tap in the house, no bath, and a communal toilet shared by three or four other houses. None of these was metered, the charge for water being a percentage of the value of the property.[D19]

Reconstructing the Jackson Purification Plant

Jackson, Miss., is modernizing its 10 mgd filter plant and enlarging it to 14 mgd, meantime keeping it in continuous operation. One of the two old settling basins is converted into a rapid-mixing chamber and flocculation basin, and a new settling basin, two 2 mgd filters and a reservoir built. Also added are a chemical storage house, two rapid mixers, two mixing basins with slow-mixing flocculators, and a 100,000 gal. elevated wash water tank.[E9]

Maintenance of Los Angeles Distribution System

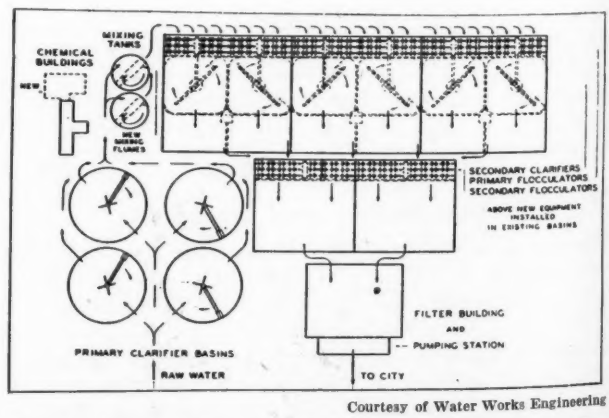
Los Angeles, Calif., has 4,276 miles of pipe in its distribution system and 1286 miles of service pipe. These are maintained and operated by 95 men. There are 60,100 gates and 21,900 fire hydrants, maintained and operated by 37 men. There are 322,600 small meters, which are maintained and operated by 50 men in the field and 18 in the shop; and 117 mainline meters and recorders, on which 2 men make all repairs and calibrations. Sixty-five men keep up the grounds around 50 elevated tanks and 33 distribution reservoirs. Six men maintain 70 mainline regulator stations, with their regulators, altitude valves, relief valves, and air valves. Fifty-nine men operate 185 pumps in 57 pumping plants, and 3 others make major repairs. Five men are in charge of 20 automatic chlorinators, 6 emergency ones at pumping plants, and 3 portable ones and 2 hypochlorite machines.[F43]

Depreciation Of Water Works

A Committee on Depreciation appointed by the National Ass'n of Railroad and Utilities Commissioners submitted a report in 1943, which was studied by a Depreciation Committee of the AWWA appointed in January 1944 to determine how it affected water utilities. On April 27th the latter committee, "representative of more than 12,000 water works in the United States, of which approximately 80% are municipally owned and operated," submitted views at divergence with those expressed in the NARUC committee report. The AWWA committee holds that most waterworks property does not depreciate in a straight line and that the straight-line theory should not be used in determining accrued depreciation of waterworks structures, many of which have lives of 50 to 100 years or more; that no method of financing, such as the recommended sinking-fund theory with no deduction for accrued depreciation, can add to or detract from actual depreciation; that the adoption of a straight-line depreciation for long-lived property produces a depreciation reserve greatly in excess of the requirements. *Annual* allowances for depreciation must be sufficient to cover contingent depreciation; *accrued* depreciation does not reflect casualties until they occur, hence the balance in the depreciation reserve usually should be somewhat larger than the actual accrued depreciation. With short-lived properties the divergency between sinking-fund, present-worth, and straight-line annual allowances is small, but with long-lived structures such as water mains the inapplicability of straight-line depreciation becomes most apparent.[A78]

Softening At Kansas City

In 1942 Kansas City, Mo., added water softening facilities to a purification plant being built in 1927 which comprised plain settling, coagulation and settling, and filtration. The softening facilities added included a slight revision of the quick mixing arrangements, flocculators for more adequate softening reaction time, clarifiers for continuous removal of lime sludge, and another set of flocculators for secondary coagulation ahead of the filters. All of this was installed in basins that were a part of the



Courtesy of Water Works Engineering

Layout of treatment plant with softening included at Kansas City, Mo.

original plant. Softening sludge is added to the water as it enters the plain settling basins and improves the sedimentation greatly. For quick mixing, hydraulic jump flumes were substituted for spiral inward-flow mixing tanks.

Six months after this plant went into operation a poll of water users showed that 77% considered softening an improvement; 15% thought it better in some ways but worse in others; 4% thought it worse, and 4% noticed no difference.[F35]

Sodium Silicates In Water Purification

In 1943 at least 23 towns, mostly in Illinois and Indiana, regularly added sodium silicates to the finished water to protect pipe lines. The most economical and satisfactory grade for coagulation purposes approximates a 1:3.2 ratio. The stable silica sol produced for coagulation purposes is highly hydrated and bears a negative electrical charge, and this and the power of contraction may be plausible explanations of its efficiency. Generally it has been found that its use greatly extends the range of pH over which coagulants give good flocculation. The formation of a wet gel is to be avoided, since such a gel may plug lines and require shoveling from mixing tanks. Using a process developed by J. R. Baylis at Chicago, it is found that the chemical cost of treatment with straight alum exceeds that of silica sol plus alum by 5% in winter, when weak coagulation is experienced, but is 15% less in summer. At St. Louis, Mo., it was determined that a ratio of one part of sodium silicate to 4 parts of aluminum sulfate gave the best results; the mixture being added to the water soon after mixing, since it lacks stability. In general, used in flocculation, sodium silicate produces a large, dense floc; it is of special value when temperature and turbidity are low; used in lime softening operation, it may permit reduction or elimination of alum.[A79]

Minerals In Water

The U.S.P.H.S. in 1943 published standard limitations of certain minerals safely allowable in water. An investigation of the actual amounts found in 37 cities gave the following results: Manganese and iron combined—Standard, 0.30 mg. per liter; maximum city, Birmingham, Mich., 2.53; minimum, Atlanta, Ga., 0.019; mean, 0.317. Lead — Standard, 0.10; maximum, Louisville, Ky., 0.04; minimum, Dayton, O., 0.001; mean, 0.011. Copper—Standard, 3.0; maximum, Fall River, Mass., 0.58; minimum, Providence, R. I., 0.006; mean, 0.059. Zinc—Standard, 15.0; max., Toledo, O., 0.86; min., Boston and Minneapolis, none; mean, 0.136. Arsenic—Standard, 0.05; max., Cincinnati, 0.008; min., all but 7 cities, none. Fluorine — Standard, 1.0; max., Lima, O., 1.70; min., Cleveland, O., 0.02; mean, 0.32. "The wide use of copper, brass, lead and galvanized piping to deliver water did not appear to introduce hazardous quantities of lead, copper or zinc into the waters studied."[A80]

Concerning the hygienic significance of these minerals in water, the authors say that iron is harmless and its limitation is desirable only in relation to appearance and taste. (These statements refer to physiological effect only). Only one case has been found of illness attributed to manganese. The limit for zinc was formerly 5 ppm, was raised to 15, and could be 40 or more; except that, if used for making acid drinks, it might form poisonous zinc compounds such as zinc citrate. Copper is essential for man and it is difficult to retain in the system enough to cause acute illness. There is apparently no danger in the use of copper sulfate as an algicide. For lead, the USPHS standard of 0.10 ppm is safe and not difficult to meet. Fluorine has no toxic effect if the water contains only 1 ppm, probably several times this would be safe, but 1.2 ppm causes mottled teeth. Arsenic occurs only in traces, if at all, in purified water; probably never enough to be a health hazard. The toxic doses of aluminum, tin, silicon, boron, chromium, titanium, nickel and strontium are so high that they are never likely to occur.[A81]

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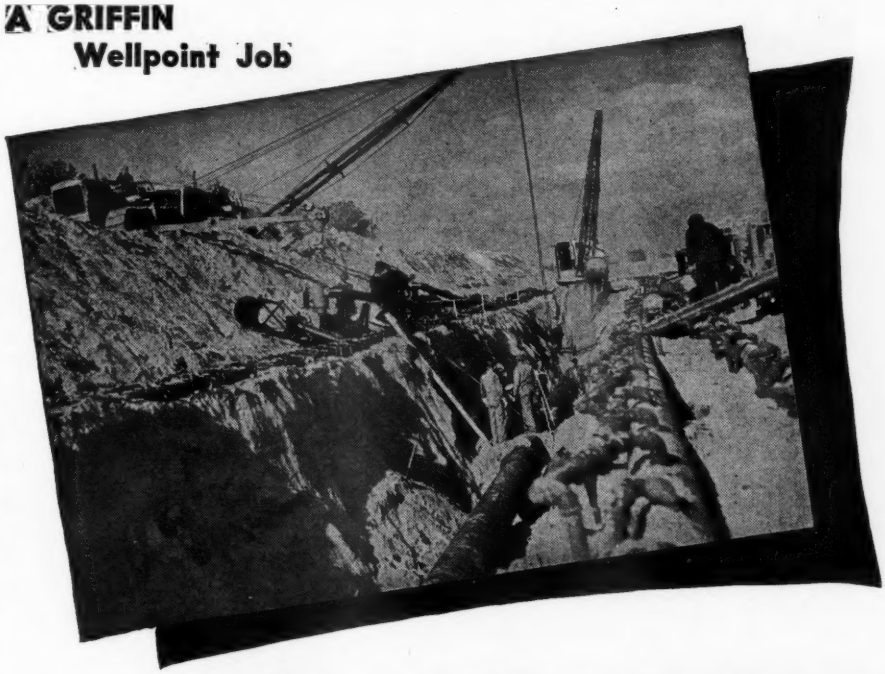

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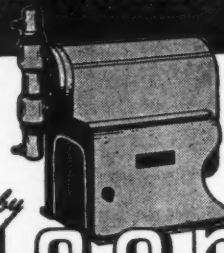

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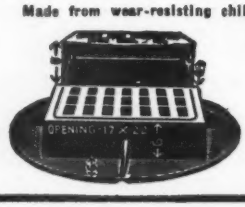

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Plankton In Lake Michigan

Lake Michigan has a restricted plankton population, mostly diatoms and yellow-green flagellates; but with the rise in population along its shores the number is naturally increasing. Studies made of the lake near Chicago in 1942 showed relatively few—only a half or a third as many as would be found in almost any stream in the Ohio river basin. The diatom flora may be increasing in numbers and in species. They seem to thrive better than some others on a very low nutritional plane. Cryptophyceae and chrysophyceae seem to be increasing in types and probably in numbers. Since many of them cause trouble, any increase in their population would increase water problems. These are all photosynthetic forms, and it might be possible to escape them, at least for a while, by lowering the water intakes.[A84]

Split Treatment In Water Softening

"At Ann Arbor, Mich., development work on a full plant operation scale has produced a method of softening ordinary waters that is more trouble free and dependable than experienced heretofore. By this method it is entirely feasible to soften most waters to any reasonable degree and at the same time obtain a settling tank effluent so completely balanced that no incrustation will take place on the filter sand, nor will the water be the least bit aggressive."

About 75% of the water passes through the primary rapid mixing tank, the slow mixing basin and the settling tank, and is mixed in the secondary rapid mix tank with the untreated 25%, return slurry, activated carbon and soda ash. All of the lime is added to the major flow. No alum is used. The mixture is rapidly agitated, slow mixed and settled. This treatment eliminates the obnoxious first-stage sludge; recirculating only the second-stage sludge avoids the major disadvantage of slurry recirculation. However, it removes only 75% of the magnesium.[A85]

Chlorinating Galveston's Supply

The water supply of Galveston, Texas, is derived from wells 20 miles away and brought through a 30" line to storage basins on Galveston island. At times of low flow the well pumps can deliver the water directly to the basins, but booster pumps near the wells must operate during high consumption. Breakpoint chlorination is applied at the wells, the capacity being 10 ppm at maximum design flow, giving 3 ppm beyond the typical break, which was considered sufficient to maintain residuals through the storage basins, but not beyond them into the distribution system. Therefore, an additional dose of chlorine is applied as the water leaves the basins. At both points the chlorine is applied through small boosters, the dose rate being kept constant by automatic proportional feed units, with Venturi meters as actuating devices.[F44]

Joint Operation of Water Works and Sewerage

In Fort Dodge, Iowa, a Manager of Utilities has under his control the water department, hydro-electric plant, street lighting system, sewers, sewage treatment plant and garbage disposal. There are 5,471 water consumers, all metered; 69.5 mi. of mains and 469 fire hydrants. The sewer rental rate is based on the water consumption and charges for sewer and water are combined on one bill. All purchasing is handled through one office. One office force and set of equipment do the work of all departments. There is cooperation in the use of equipment such as trucks, compressors, portable pumps, etc. Men and foremen can be shifted from one department to another, and are paid from the funds of the department for which they work. This all makes for economy. "About the only objection I have observed . . . is that the manager's or superintendent's time might be so divided that he could not give sufficient time to any one problem."[G20]

Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

A *Journal, American Water Works Ass'n.*

June

77. Employee Progress Rating and Personnel Records. By Philip B. Niles. Pp. 603-614.
78. Depreciation Committee Report. 1944 report on report of Committee of N. A. R. U. C. Pp. 615-625.
79. Water Purification Methods Involving Sodium Silicates. By Harold R. Hay. Pp. 626-636.
80. The Concentration of Certain Trace Metals in Drinking Water. By Robert A. Kehoe, Jacob Cholak and Edward J. Largent. Pp. 637-644.
81. The Hygienic Significance of the Contamination of Water with Certain Mineral Constituents. By Robert A. Kehoe, Jacob Cholak and Edward J. Largent. Pp. 645-657.
82. Cleveland's Mobile Emergency Pump. By S. C. Simmermacher. Pp. 658-661.
83. Water Works Design Under Wartime Conditions. By Wylie W. Gillespie. Pp. 662-668.
84. Quality and Quantity of Plankton in the South End of Lake Michigan in 1942. By James B. Lackey. Pp. 669-674.
85. Developments in Split Treatment Water Softening. By Donald Walker. Pp. 675-681.
86. Water Conservation and Population Shift. Pp. 698-702.

D *The Surveyor*

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17. Research in Water Engineering. By C. A. Bradley. Pp. 195-196.

May 12

18. Pipe Proportioning in Domestic Water Supply Systems. By A. Moody. Pp. 219-220.

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19. *p.* The Pros and Cons of Domestic Supplies by Meter. By J. R. Roberts. Pp. 221-222.

E *Engineering News-Record*

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8. What's Ahead for Waterworks Utilities. By Arthur E. Gorman. Pp. 99-101.
9. Wartime Waterworks Modernization. Pp. 102-105.
10. Reconnaissance in the Waterworks Front. By Ellsworth L. Filby. Pp. 106-110.
11. *c.* Abyssinian Driven Tube Well Has Virtues in Porous Soils. By Colin Johnston Robb. P. 110.
12. Postwar Waterworks Prospects. By Elsie Eaves. Pp. 111-112.

F *Water Works Engineering*

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34. Milwaukee Filter Experience. By James E. Kerslake. Pp. 554-556.
35. Two Years of Water Softening at Kansas City, Mo. By Melvin P. Hatcher. Pp. 557-559.
36. U. S. Ground Water Geologist Warns Against Water Diviners. By O. E. Meinzer. P. 571.
37. Outlook for Postwar Activity. A symposium. Pp. 560-568.
38. Chlorine and Its Use. P. 575.
39. The Successful Fight Against Water-Borne Disease. By Norman J. Howard. Pp. 579, 616.
40. Hampton Roads Area Satisfies Huge War Demands. By Ellwood H. Aldrich. Pp. 580, 583, 584, 587, 616.
41. Operating Delaware Aqueduct by Emergency Devices. By Charles M. Clark. Pp. 588, 591.
42. New Rondout Water of Great Benefit to New York. By Tobias Hochlerner. Pp. 592, 595, 660.
43. Distribution Practices at Los Angeles, Calif. By Richard E. Hemborg. Pp. 596, 599, 628.

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44. Recent Waterworks Improvements at Galveston, Tex. By G. Thornton. Pp. 680-682, 719.
45. Distribution Leakage. By Fred B. Nelson. Pp. 689-690, 712.
46. Chlorine and Its Use. Pp. 693, 717.
47. Water Policy Plan Proposed by U. S. Chamber of Commerce. P. 695.

G *Water Works & Sewerage*

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20. Water Works and Sewerage Under One Management. By John W. Pray. Pp. 153-156.
21. *p.* Maintenance of Pumps. By Harry Stock. Pp. 169-170.

J *American City*

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13. A Water Rates Comparison. Pp. 105, 107.

L *Civil Engineering*

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5. War's Impact on a Chicago Filtration Plant. By W. W. DeBerard and F. G. Gordon. Pp. 233-236.

M *Water and Sewage*

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12. *p.* Dental Caries and Water Supplies. By Harold K. Box and H. J. Hodgins. Pp. 42, 43, 98, 100.
13. *p.* Canada's Groundwater Resources from a Geological Aspect. By B. R. Mackay. Pp. 44-46, 106, 116-124.
14. *p.* Water Distribution Systems. By W. D. Hurst. Pp. 47-48, 78-90.
15. *p.* Conservation and Water Supply. By A. F. Coventry. Pp. 49-54, 76.
16. *p.* Utility Administration in Canada. A symposium. Pp. 56-70.
17. *p.* Good Waterworks Management. By Wendell R. LaDue. Pp. 70-76.

P *Public Works*

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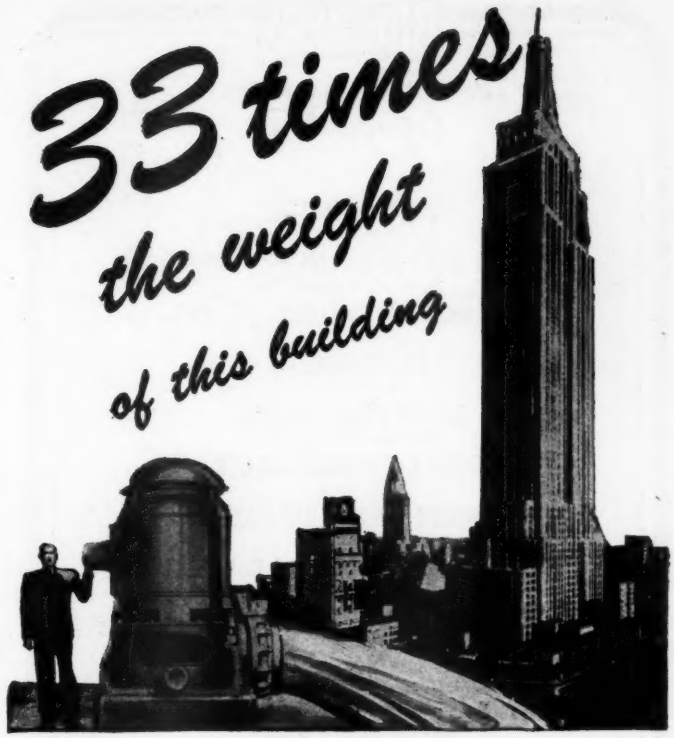
26. Rehabilitating a Gravel Well. By A. A. Ulrich. Pp. 17-18, 80.
27. How Soon Can You Rewind My Motor? By Archer B. Stuart. Pp. 28, 78.
28. Application of Geophysics to Groundwater Problems. By Carl A. Bays and Stewart H. Folk. Pp. 29-30.
29. Water and Sewage Chemistry and Chemicals. Pp. 32-68.
30. *n.* Maintenance Records for Waterworks Operators. P. 73.



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WATER AND SEWAGE WORKS
Equipment

VENTURI METERS
Bulletin 293B
TYPE M and FLO-WATCH INSTRUMENTS
Bulletins 324 and 318A
VENTURI EFFLUENT CONTROLLERS
Bulletin 321A
FILTER GAUGES
Bulletin 329
LIQUID LEVEL GAUGES
Bulletins 326 and 329
SAND EXPANSION GAUGES
Bulletin 335
KENNISON OPEN FLOW NOZZLES
Bulletin 334A
CHRONOFLO TELEMETERS and CONTROLLERS
Bulletin 320A
TOLEDO-CHRONOFLO CONVEYOR SCALES
Bulletin 322

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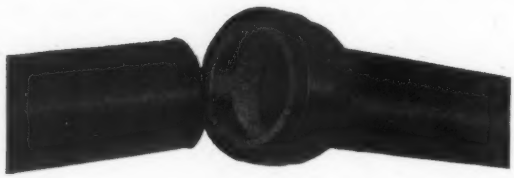

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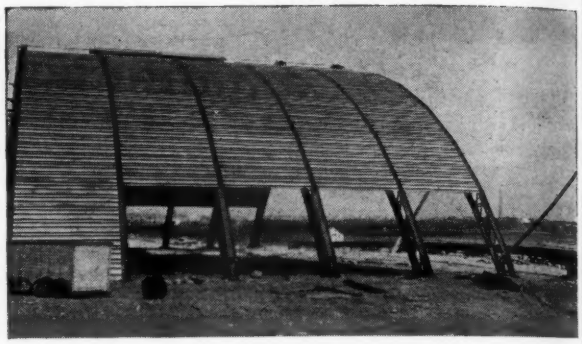


Armco Hangar

New Portable Steel Hangar

The American Rolling Mill Co.
Middletown, Ohio

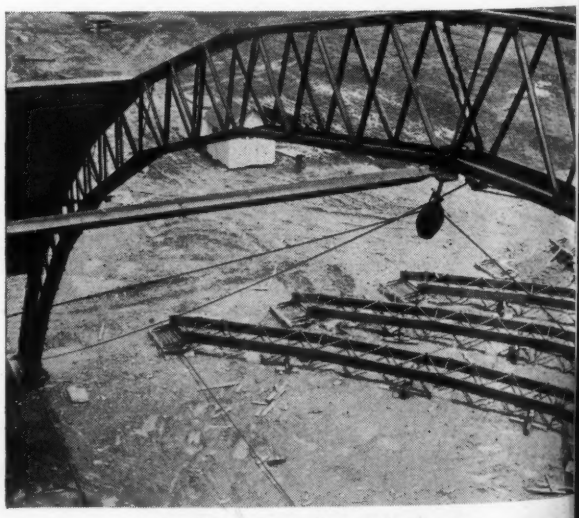
Simplicity of erection and saving of critical materials are among the advantages claimed for a new portable steel hangar building. It is capable of carrying a higher load per pound of steel than any other current designs.

Two sizes of hangar have been built to date, one with an inside width at the base of 152 ft. and a height of 36 ft. 7 in.; the other with a width of 192 ft. and a height of 48 feet. The length may be any multiple of 17½ ft.

The arches assembled at ground level, are made up of pressed metal units bolted together into segments that are identical and interchangeable. These circular arch rings weigh a maximum of 3 and 7 tons and are hinged to a corrugated base plate. By means of two 40-ft. poles, two sheaves and a winch truck, an arch ring can be raised within 15 minutes.

Space between the arches is covered with standard Steelox panels. These span from arch to arch, serving both as purlins and roofing. They are bolted to the top chord of the arches. These panels are the same as have been in use for frameless steel building construction. The ends of the hangar, including the doors, are built of Steelox panels. A new type of multiple door section supported on a single rail at the bottom is a feature.

Further details are given in a 24-page booklet entitled



Detail of Arch in Armco Hangar.

"ARMCO Hangar Buildings" which can be obtained free by addressing The American Rolling Mill Company, at Middletown, Ohio.

Orangeburg Fibre Pipe

Fibre Conduit Co.
Orangeburg, N. Y.

This company is manufacturing and promoting the use of bituminous pipe composed of 25% fibre and 75% coal tar pitch. The pipe is formed on special machines to develop a homogeneous structure (not laminated) of fibres oriented in three planes, so that the structure of the pipe is uniform throughout. After forming and drying, the pipe is subjected to high vacuum and then thoroughly impregnated with coal tar pitch.

Orangeburg Fibre Pipe.

The product is claimed to resist inorganic acids, alkalies, and salts as found in industrial wastes, cinder fill, and corrosive soil conditions. It is free from corrosion scale and tuberculation. The taper sleeve joint makes a tight line that roots cannot enter into the joints, and the coal tar pitch with which Orangeburg pipe is impregnated is toxic to root growth.

Joints can be made rapidly. A 2° taper is accurately machined on the ends of each length of pipe. A mating taper is machined on the sleeve coupling and when the coupling is driven on to the pipe, a tight seal is made. A block is placed over the end of the coupling and with a few gentle blows (use about a 12-16 lb. sledge) the coupling and the pipe are driven together so that the coupling makes up firm against the shoulder of the pipe. Compared with other types of pipe there are fewer joints to make because lengths of Orangeburg Fibre pipe are longer.

The use of this bituminous pipe is being promoted for house connections to sewers and septic tanks, for septic tank filter beds, and irrigation and sub-soil drainage, and downspouts for buildings. Full details are given in a 20-page folder which the company will be glad to send upon application.

Liquid Vibrating Screens

Link-Belt Company
2045 West Hunting Park Ave., Philadelphia 40, Pa.

A new, 8-page, illustrated Book No. 1977 on Liquid Vibrating Screens for recovering waste products and effectively reducing pollution, is announced.

Originally introduced by Link-Belt for removing cuttings, shale and sand from rotary oil well drilling mud, it is said that hundreds of these screens are now in successful use in this service, as well as in extracting solids from industrial waste waters, sludge, sewage, and other liquids.

In many of these installations, the screen has reduced stream pollution, in addition to recovering solids that are being made into valuable by-products.

The new book contains numerous photographs of actual installations, and gives construction details, dimensions and weights of the various sizes of screen available for this type of service.

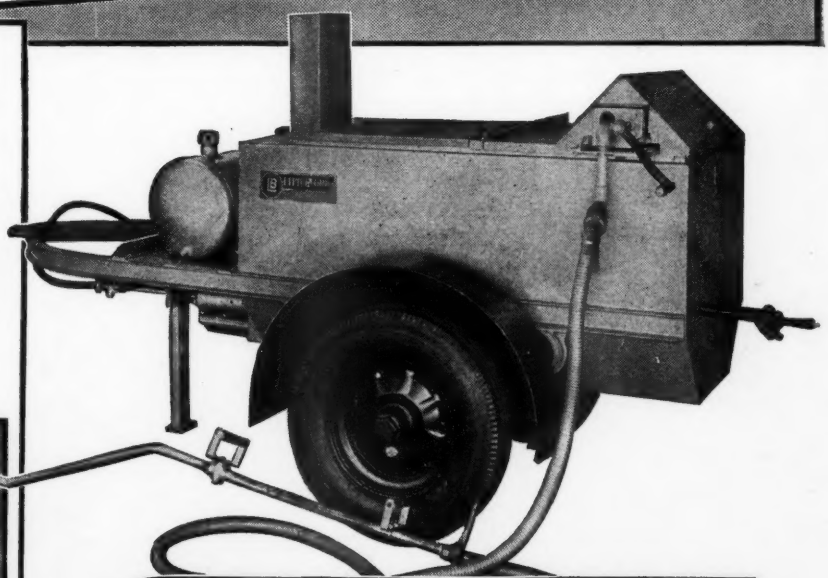
Model No. 84-HD MAINTENANCE KETTLE

Maintenance and Repair of our vital highway system is important today and post war. So have a Littleford 84-HD Kettle on the job to speed up the work and save unnecessary road damage.

The 84-HD is the fastest and safest heating kettle yet designed. It has patented features that make it heat faster and produce a continuous flow of material. With a Hand or Motor Spray Attachment, the 84-HD can cut repair time to a minimum. The more time saved on the job, the more jobs can be done.

For better road repair, use the best Equipment. Use a Littleford 84-HD Kettle.

An 84-HD with Hand Spray Attachment



BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE - 1900

LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati, 2, Ohio

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

A copy of new Book No. 1977 may be obtained by writing direct to the manfacturers.

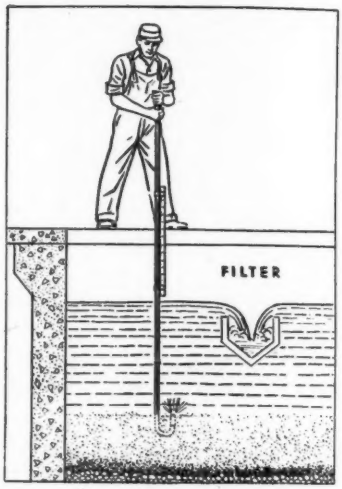
New Instrument Measures Sand Expansion With a Light

Builders-Providence, Inc.
Providence, R. I.

Designed to assist in maintaining filter beds in proper condition, obtain maximum filter runs and reduce the use of wash water to a minimum, a new instrument has been developed by Builders-Providence, Inc. (division of Builders Iron Foundry), Providence, R. I. This instrument, called a Hook Light Sand Expansion Gauge, consists of a tube of corrosion-resisting metal sufficiently long to allow the operator to reach the filter bed from the walkway. A handle at the upper end of the tube encloses dry cell batteries and a switch. The lower end of the tube is bent into a hook with small light bulb and magnifying lens at the end. On the side of the tube is an adjustable scale which can be clamped at any height.

To use the Hook Light, the operator lowers the tube until the bottom of the bend just touches the top of the unexpanded sand bed. With the unit in this position, he adjusts the scale so that its lowest graduation is in line with a reference mark. During back washing he raises the instrument until the light can just be observed. Since the scale has been compensated for the distance from the light to the bottom of the bend, the amount of expansion (in inches) is then read directly on the scale. Operators report that they find the new instrument far more accurate than the makeshift cup or bottle method and easier to operate.

The Hook Light measures directly the actual expansion of the sand at all times and seasons, without reference to water temperature or size of the sand grains. It eliminates all uncertainty; duplicate readings within 1/16 inch can be consistently obtained. This portable Hook Light is also said to be useful in checking permanently installed Sand Expansion Indicating and Recording Gauges. Bulletin 348 describing the new Hook Light can be obtained by writing the manufacturer.



Builders Hook-Light Sand Expansion Gauge

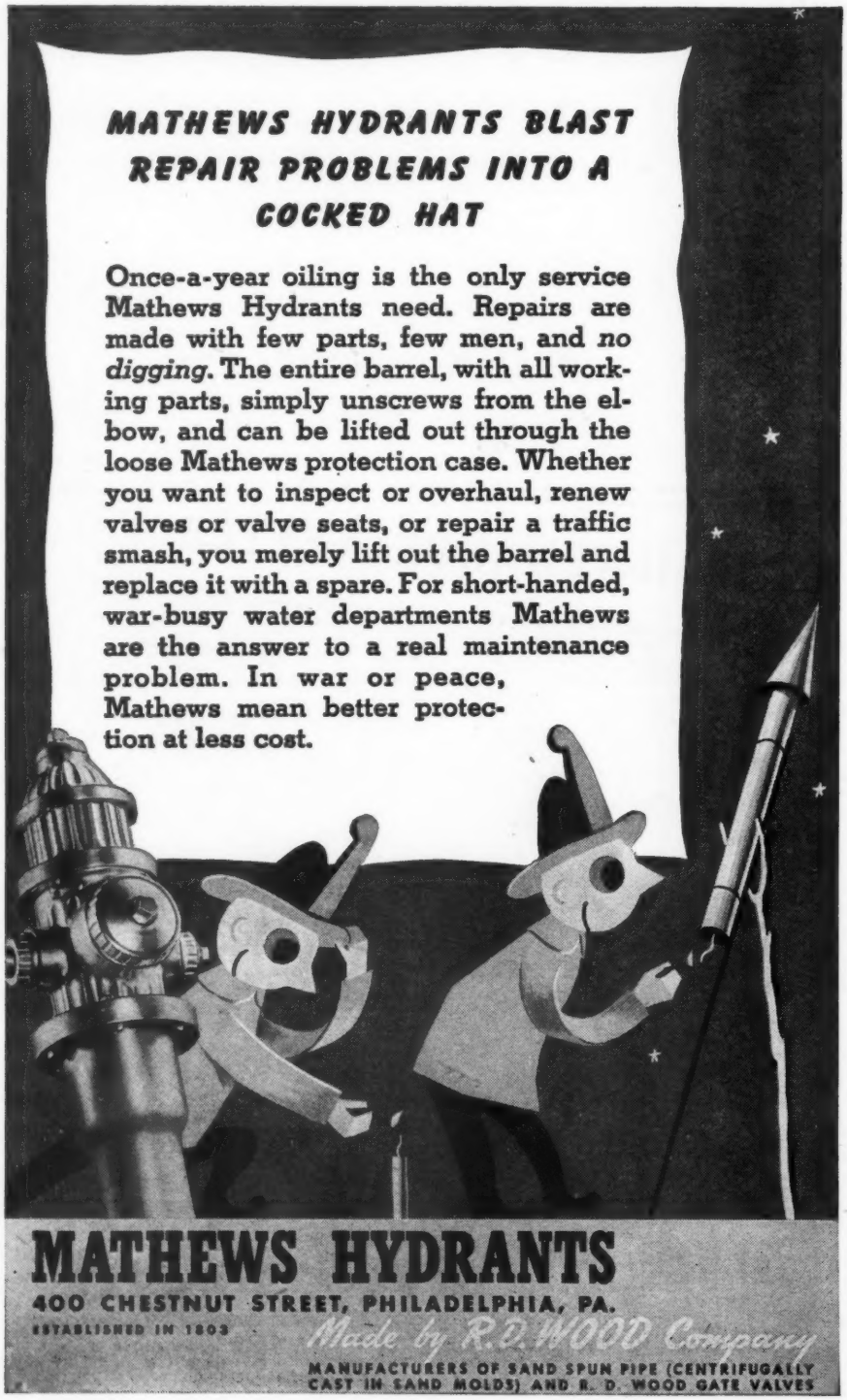
Air Inlet Valves Prevent Collapse of Gravity Flow Lines

Simplex Valve & Meter Co., 6750 Upland St., Philadelphia 42, Pa.

A new 12-page compilation of complete data on the Air Inlet Valve has been released by Simplex Valve & Meter Company. The bulletin provides facts and preferences for engineers on the installation and operation of air inlet valves installed on thin-walled gravity flow lines to eliminate the possibility of collapse as a result of sudden drops in the pressure in the pipe line.

Nomographs and tables are given for the accurate determination of the correct positioning, frequency, and size of the inlet valves required for trouble-free operation of the gravity flow line.

The Air Inlet Valve is durably constructed, internally and externally; the non-collapsible float, which cannot be distorted by pressure, is integral with the valve. The float is buoyed by the


MATHEWS HYDRANTS BLAST REPAIR PROBLEMS INTO A COCKED HAT
Once-a-year oiling is the only service Mathews Hydrants need. Repairs are made with few parts, few men, and no digging. The entire barrel, with all working parts, simply unscrews from the elbow, and can be lifted out through the loose Mathews protection case. Whether you want to inspect or overhaul, renew valves or valve seats, or repair a traffic smash, you merely lift out the barrel and replace it with a spare. For short-handed, war-busy water departments Mathews are the answer to a real maintenance problem. In war or peace, Mathews mean better protection at less cost.
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MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

water in the line until a condition arises which tends to create a vacuum—the buoying effect of the water is then destroyed and the float drops from its seat, admitting air and breaking the vacuum in the line. The valve also serves a dual purpose in releasing air when the pipe line is being filled.

Complete details of the principle of installation and operation, and the design and construction of the Simplex Air Inlet Valve are published and illustrated in Bulletin 125. Write for your copy to Simplex Valve & Meter Company.

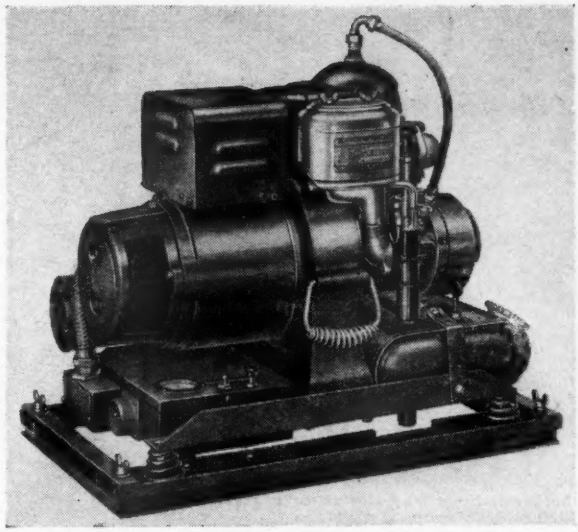
Bull's Eye Sight Flow Indicators

Fischer & Porter Company
938 County Line Road, Hatboro, Pa.

A complete line of Bull's Eye Sight Flow Indicators is shown in the new Fischer & Porter Catalog 93-B. Bull's Eyes installed in your piping systems will enable your operator to determine whether or not fluid is flowing and also to observe it visually.

Indicators for every industrial service are illustrated. For ordinary applications, there is the "flapper" type with a hinged flapper which swings outward or upward to register the passage of fluid. A "drip-lip" type has a clearly visible lip so arranged as to register small or intermittent flows. Indicators for opaque flows, or with electric contacts to actuate external alarm devices are among others shown. Of special interest is the new wheel type sight flow with turbine type blades that immediately shows low flows and changes in flows.

Catalog 93-B gives information on sizes, dimensions, types of connections, etc., to simplify specification. It will be sent to you, without obligation, upon your request to Fischer & Porter Company.



Homelite Portable Generator

Gasoline-Engine Driven Portable Generators

Homelite Corporation
Port Chester, N. Y.

When dependable current is needed in a hurry—particularly where a power line is not available—these portable, lightweight generators are ready to supply current for floodlights, electric tools, or any other application.

The armed forces are using large quantities of these generators—charging batteries in bombers and tanks, starting plane engines and ground testing electrical equipment, operating tools and floodlights in machine shop trucks. They are built to perform without fail under

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Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders—you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog—no shut-off valve to jam—no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stocked for immediate delivery in 100 principal cities.

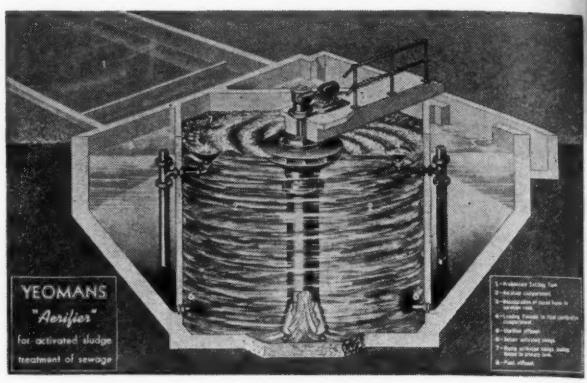
GORMAN-RUPP SELF-PRIMING CENTRIFUGAL PUMPS

THE GORMAN-RUPP CO. Mansfield, Ohio

When writing, we will appreciate your mentioning **PUBLIC WORKS**

the most trying military conditions—in sub-zero temperature or tropical heat.

Capacities—Model HRUA—1500 watts, 110 volts, A.C.; Model HRU-120—1500 watts, 120 volts, D.C.; Model HRU-28—2000 watts, 28 volts, D.C.; Model HRUS-15—1500 watts, 14 volts, D.C. Any of these models can be mounted on a dolly for rolling portability. The heaviest model weighs 115 pounds.



Yeomans Aerifier

A New 12-Page Folder on Yeomans "Aerifier"

This new Bulletin No. 6650 fully describes and illustrates Yeomans "Aerifier" in use and includes two pages of drawings. The manufacturers say "the Aerifier provides both mechanical aeration and final clarification in the Activated Sludge process within a single concrete structure." When a high degree of purification is required by communities and institutions, it is claimed that Yeomans "Aerifier" saves installation and maintenance costs by combining two steps of the process in one concrete structure. It makes the Activated Sludge process for secondary treatment available in packaged form. Write for Bulletin 6650 and get the full details.

N. J. Kenny

A. R. Whittaker

PEMCO Personnel Changes

Colonel W. F. Rockwell, President of Pittsburgh Equitable Meter Company, has announced the following changes on the executive staff:

N. J. Kenny, formerly General Manager of the National Meter Division in Brooklyn, has been transferred to the home offices in Pittsburgh where he will serve as Assistant to Colonel Rockwell. Mr. Kenny has also been appointed Chairman of the Post-War Products Development Committee.

A. R. Whittaker, formerly Factory Manager of the National Meter Division, will assume the duties of General Manager and has been placed in complete charge of all functions at the Brooklyn factory.

W. A. Gormley

Gormley Appointed by American Car and Foundry Co.

W. A. Gormley, recently appointed Sales Manager of the Valve Department of American Car and Foundry Company, has been actively engaged in the valve field for more than 20 years. He attended Duquesne University's School of Accounts, Finance and Commerce, graduating with a B.C.S. Degree. In 1923, he organized and was co-owner of the Eastern Steam Specialty Company of New York City, manufacturing agents handling plug valves and engineering specialties, remaining there until 1935 when he came to A. C. F.

Clarence Frazier Succeeds Vernon Edler as Manager of Peerless Pump Division

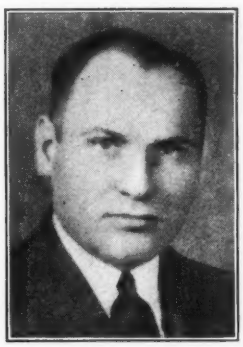
The new Peerless manager, who joined the corporation in 1941 as assistant to the president, will have his headquarters in Los Angeles. Other branches of the division are located at Fresno, Calif., and Canton, Ohio.

Peerless Pump division has played an important part in the war effort, beginning with the shipment of a large number of pumps on 36 hours notice required by the government to raise the war ships which had been damaged in Pearl Harbor during the Japanese sneak attack.

Subsequent developments have been the submersible pump for emergency duty on shipboard, the gasoline transfer and refueling pumps used on tankers and air fields, and the Hi-Lift used by Army and Marine Corps for advance base water supply.

Probably the most important contribution to the war effort has been the development of the "Water Buffalo" amphibious tanks, the first model of which was conceived and built by Peerless engineers.

F. C. Arens



R. H. Smith

Pittsburgh Equitable Meter Advances Arens and Smith

F. C. Arens has been appointed District Manager of the Boston office, and Richard H. Smith has been placed in charge of water meter sales for the New England territory for the Pittsburgh Equitable Meter Company.

Mr. Arens has had extensive experience to qualify him for his managerial position. For the past five years, he has been attached to the sales staff, covering gas utility and industrial accounts in the New England area.

Mr. Smith has a wide background of experience in the water works field. A native of Hamilton, Massachusetts, he joined the old National Meter Company in 1922, and was assigned the territory comprising the three northern New England States: Maine, New Hampshire, and Vermont.

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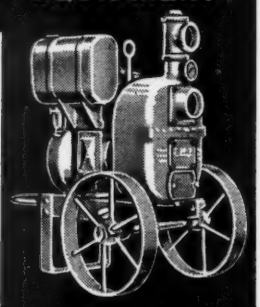

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11. Good illustrations and useful data on all types of Heltzel Highway Bins, for truck mixer charging, bulk cement plants, enclosed bucket elevators, belt conveyors, etc. Heltzel Steel Form & Iron Co., Warren, O.

Cold Mix Plants

15. New catalogs and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Concrete Curing

33. 64-page manual of concrete curing with calcium chlorides. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

Concrete, Early Strength

38. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products." Issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Generators

80. Two portable generators, one for AC and the other for DC current are described in new bulletin issued by Homelite Corp., Port Chester, N. Y. Commonly used for operating electrical equipment in planes, tanks and trucks, or to charge batteries or to supplement batteries for starting main engines, etc.

Forms, Curb and Gutter

91. Curb and Gutter and Sidewalk Forms. Many types available, including battered face curb form especially for modern traffic conditions. Heltzel Steel Form & Iron Co., Warren, O., will send booklets on request.

Finishing Machines

96. Flex-Plane Finishing Machines around the world. Handsome new folder shows various models in action. One machine combines screeding and longitudinal and transverse contracton joint installing. Available from Flexible Road Joint Machine Co., Warren, Ohio.

Graders, Patrol

98. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Co., Aurora, Ill.

Joints, Expansion

103. Joint Data. Expansion and contraction ribbon joint installers. Flexplane units and finishers. Catalog illustrates how machine installs both longitudinal and tranverse joints rapidly. Flexible Road Joint Machine Co., Warren, Ohio.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee 10, Wis.

Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures, 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York 6, N. Y.

Pumps

120. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Port Chester, N. Y.

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

125. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

126. "Humdinger" 2- to 8-inch self-priming portable pumps. A 23-page illustrated booklet giving full details. Address: Ralph B. Carter Co., Hackensack, N. J.

Road Building and Maintenance

127. Force Feed Loader that picks up windrowed material from road surface and loads it quickly and easily into trucks is described in new illustrated folder issued by Athey Truss Wheel Co., 5631 W. 65th St., Chicago 38, Ill.

128. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

130. BG Maintainer, a powerful, speedy, low-priced machine for light road maintenance. Write for folder. Huber Mfg. Co., Marion, Ohio.

131. Speed Scoop. A versatile small scraper unit, ideal for emergency repairs. Illustrated folder issued by Huber Mfg. Co., Marion, Ohio.

Rock Drill Maintenance

132. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland 5, Ohio.

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133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

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139. "Ironeroller" 3 Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. The Hercules Roller Co., Bucyrus, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Co., Aurora, Ill.

141. Three-Wheel Rollers. Huber Automative type rollers in 5 to 8 ton sizes and Huber 10 & 12 ton diesel rollers. New bulletins give full details and specifications. Huber Mfg. Co., Marion, Ohio.

142. Tandem Rollers. Variable weight tandem roller with three speeds forward and reverse for new highway surfacing and old road conditioning. Huber Mfg. Co., Marion, O.

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150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Division, 40 Rector St., New York 6, N. Y.

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich., for Bulletin No. 29.

Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia 7, Pa.

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195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York 54, N. Y.

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300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

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350 "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Sanitary Engineering

Aero-Filter

356. Aero-Filter Design Data is given in a new 32-page catalogue. It contains information on Advantages of Aero-Filter Process, Single Stage vs. Multi Stage Treatment, Filter Loadings, Rates of Flow and Results, Filter Depths, Recirculation, Sewage Pumps and Pump Control. Approximately 15 pages of blue prints are included in this instructive catalogue. Write Lakeside Engineering Co., 222 W. Adams St., Chicago 6, for a copy.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia 42, Pa.

358. Air Valves are the subject of Rensselaer Bulletin Q in which Air Release, as well as Air and Vacuum, types are described. Address: Rensselaer Valve Co., Troy, N. Y.

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360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

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370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence 1, R. I.

Cleaning Water Mains

383. Water main cleaning by the National Method is title of 4-page folder describing methods and results obtained, with full data. National Water Main Cleaning Co., 30 Church St., New York 7, N. Y.

Cleaning Sewers With Own Forces

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles 34, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

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403. For bulletins on Vacuum Filters for dewatering primary, activated, digested or chemical sludge, write The Conkey Co., 420 Lexington Ave., New York 17, N. Y.

Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 436.

407. Fire hydrants which are flood-proof, easy to operate and service are described in Rensselaer Bulletin W., formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

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411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

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415. See listing No. 436.

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419. Double-disc gate valves; hydraulically operated valves; air, check, flap and mud valves. Fire hydrants with sliding gate or balanced valve. A 32-page catalog. Ludlow Valve Mfg. Co., Inc., Troy, N. Y.

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421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

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422. The advantages of Gunite for reservoir linings, steel encasement, sidewalls and roofs, waterproofing tanks, increasing strength of existing structures, lining sewers, etc., are illustrated in a 32-page catalog issued by National Gunite Corp., 420 Lexington Ave., New York 17, N. Y.

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423. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore 4, Md.

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432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

Meters, Water

434. Six types of iron case cold water meters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh 8, Pa.

435. "Watchdog" water meters, made in standard capacities from 20 GPM up; frost-proof or split case in household sizes. All parts interchangeable with present models of same manufacturer. For bulletins, write Worthington-Gamon Meter Co., 282-296 South St., Newark, N. J.

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437. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

439. McWane Precaulked Joint Cast Iron Pipe, in all sizes from 1¼ through 12 inches for water and sewage, equipped with various type of factory-made joints, as well as B. & S. joints. Illustrated booklet issued by McWane Cast Iron Pipe Co., Birmingham, Ala.

Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

Pipe Joint Compounds

446. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

448. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; alo sump and bilge pumps. Dayton-Dowd Co., Quincy, Ill.

Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis 8, Tenn

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles 31, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

452. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

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454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

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456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

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458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 48 pages. Address: Morse Boulger Destructor Co., 205-E East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

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479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

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483. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

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488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2438 Wolfram St., Chicago 18, Ill.

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490. Small type Conveyor Sludge Collector and Skimmer, Grit Collector, Aero-Filter and other equipment for small sewage treatment plants are described and illustrated in bulletins available from Chain-Belt Co., 1722 West Bruce St., Milwaukee 4, Wis.

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497. Ferri-floc Ferric Sulphate — a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga

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